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Railway Age

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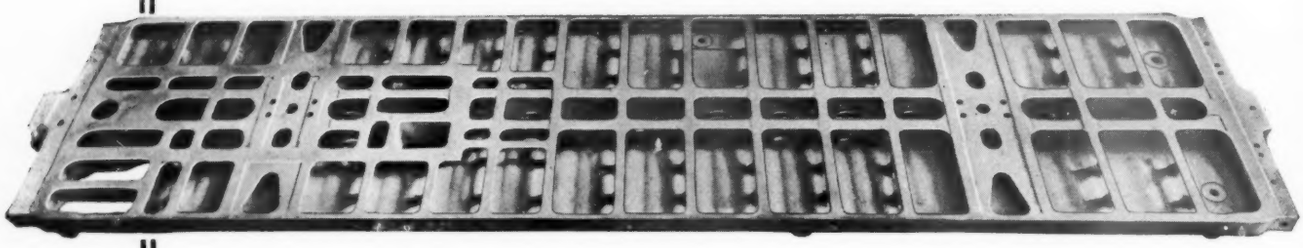

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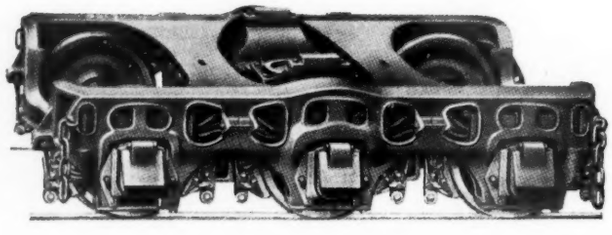

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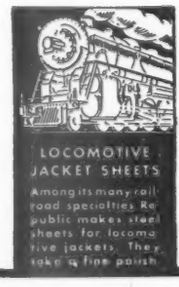
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RAILWAY AGE

Two Important Trends In Railway Affairs

Discussion of the prospects of the railways and of the large part of the manufacturing industry dependent on them for a market confuses many persons because they do not realize that there are two trends in the affairs of these industries which must be considered. One is a short range trend indicating their prospects in the near future. The other is a long range trend which has prevailed since before and throughout the depression, and which is of much greater importance.

The short range trend, which has prevailed since last July, is favorable. Allowing for seasonal variations, freight loadings have increased 20 per cent since then; and they are still increasing. Net operating income of $236,336,000 in the last one-third of 1935 was 46 per cent larger than in the last one-third of 1934. In fact, it was the largest in the last one-third of any year since 1930—a gain of $74,000,000 over 1934; of $40,000,000 over 1933; of $54,300,000 over 1932, and of $56,000,000 over 1931. Since the beginning of 1936 the trend of freight loadings has continued upward; and probably the trend of net operating income also has, in spite of increased operating expenses due to the severe weather. The increase of net operating income already has caused an increase of buying which probably is the harbinger of the best year's business for manufacturers for railways that they have had since 1930. Railway buying from manufacturers during the four years ending with 1935 averaged only about $470,000,000 annually, and in 1935 was about $520,000,000. In 1931 it was $616,000,000 and in 1930 was $1,236,000,000, an annual average of $876,000,000. A restoration to the average of the first two years of the depression would be a great improvement.

Short Range Versus Long Range Trend

But how about the long range trend? Before the depression the earning, employing and buying power of the railways was being undermined by competition of other carriers that was being aided by government subsidies to them and government failure to regulate them; and this has continued during the depression. Government policies of advancing prices and wages adopted in 1933 added about $300,000,000 to annual operating expenses. In addition, Congress at its last session sought to add almost another $100,000,000 annually by passing the Railroad Retirement Acts, the Social Security Act and the Guffey coal bill. And now, as during the last session of Congress, railway labor leaders are seeking 6-hour day, train crew and train limit legislation that would cost at least $750,000,000 annually. The passage of any part of this proposed legislation would further increase operating expenses at a time when one-third of the railroad industry is in bankruptcy.

The vitally important question is, which of these trends is going to prevail for a period of years in future—the trend since last July of net operating income, employment and buying to increase, or the longer trend tending to reduce railway traffic, net operating income and buying that has prevailed both throughout the depression, and that has been principally due to government policies.

Present Trend Favorable

If the trend that has prevailed since last July is not interrupted, but is stimulated by legislation such as the Pettengill bill to repeal the long-and-short-haul section of the Interstate Commerce Act and the bills of Co-ordinator Eastman for the regulation of water carriers, the railway situation doubtless will continue to improve, and increased railway employment and buying will contribute their share toward the restoration of prosperity.

But suppose this short range trend is subordinated and arrested by the other and long range trend? Because this long range trend usually has prevailed for years both before and during the depression the railways have been heading straight for government ownership. It leads along the road of bankruptcy of private ownership; and that would make government ownership unavoidable.

Most railway labor leaders are advocating both gov-

ernment ownership, and legislation that would bankrupt private ownership. They know what they want, and also how to get it. When those who are opposed to government ownership ascertain and face the facts with equal intelligence, and as energetically oppose policies tending and intended to cause it, the danger of government ownership will pass—and it will not pass until they do.

We are often asked two questions regarding the railroads and the railway manufacturing industry—one regarding their immediate business prospects; the other, as to whether there is real danger of government ownership. The correct answers undoubtedly are afforded by the two trends in their affairs outlined in the foregoing. The business of both the railways and the railway manufacturing industries have substantially improved since last summer and at present promise to continue to improve.

Long Range Trend Toward Government Ownership

As regards the danger of government ownership, it is hard for us to understand how there can be any serious question about it in the mind of any person who is informed regarding the trend prevailing in railway affairs throughout the last decade and the financial condition to which it has reduced the railroad industry. We do not predict government ownership either in the near or remote future. What we do predict is that if present government policies affecting the railways are continued they will compel the adoption of government ownership. What other outcome could there be? The policies referred to are policies of curtailing the earnings of the railways by aiding other carriers to take traffic from them and other policies of increasing their expenses by advancing the wages, prices and taxes they must pay.

Policies of both kinds steadily increase the difficulties of their managements in increasing net operating income from the tragically low level to which it declined at the bottom of the depression. And meantime business interests continue to encourage the government to spend huge sums on highways and waterways to increase competition with them, and railway labor leaders continue to demand legislation from Congress greatly to further increase their operating expenses.

Facts That Must Be Faced

These are facts. They must be faced, not only by railway managements, but also by business interests and the public if the long range trend for which they are responsible is not to lead finally to a national disaster. It does no good to talk and write against *effects*. The only way to accomplish anything is to deal with *causes*. It will do no good to carry on propaganda against government ownership unless the propaganda carried on effectively attacks and removes the *causes* of the drift toward government ownership.

The short range trend in the affairs of the railways and of the railway manufacturing industry is highly encouraging. Of the long range trend, the opposite must be said; and it is the task and duty of every person and agency intelligently concerned regarding the future of these industries, and of every person and agency intelligently and patriotically concerned regarding the political and economic future of the United States, to exert themselves to the utmost to change this long range trend.

Dealing with the Public

The directors of one of the largest corporations in the world have been in contention among themselves for several years about the advisability of hiring a man to have charge of publicity and public relations. The diehards were finally worn down and a solemn vote of the directors authorized the management to take the momentous step. We were asked to suggest a candidate.

The corporation bears an unusual heritage of public ill-will. It comes in direct personal contact with several million customers every year. It is a natural target for demagogic attack and is constantly on the defensive in legislative halls. All of these problems were to be solved by the new employee.

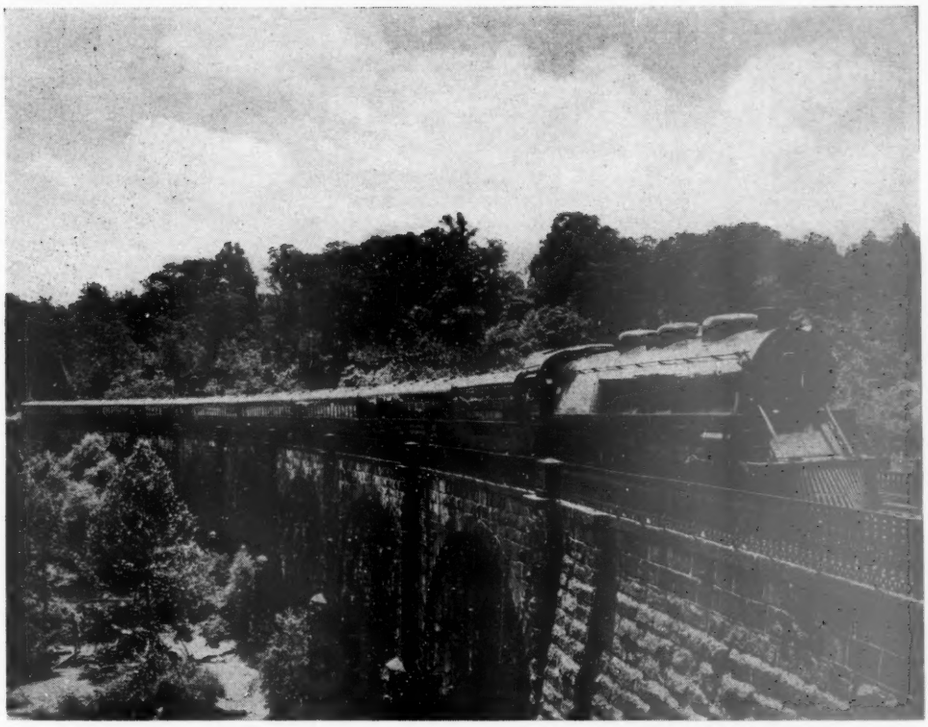
We asked what the pay would be. The answer was that they hoped to get a good newspaperman for about $4,000, but if necessary they would pay the right man $5,000 or $6,000. Therein lies an explanation of most of the maladroit things corporations do that incense the public at a cost to business of millions every year. In contrast, this very corporation paid lawyers several hundred thousand dollars as retainers alone last year and the costs of its legal department were about a million.

A wise approach to problems of public policy would have left several of its lawyers unemployed and obviated many of the judgments.

For the next 5 years, and perhaps for 10, large corporations will have no more important function than the wise handling of their public relations problems. The heads of all great corporations should be schooled in this business, but unfortunately few of them are. The next best thing is to hire the wisest and ablest man available, give him responsibility and authority in his own corporation and outside, and seek his counsel in every act that touches the public.

The rather general notion that a newspaperman, who will be content with a less income than a good house detective, is qualified or competent enough to handle the public relations of a great corporation, is one of the most amazing manifestations of corporation thinking left over from the heyday of *laissez faire*.

—Business Week, January 25, 1936



Baltimore & Ohio "Royal Blue," an Aluminum-Alloy Train, Designed to be Hauled by Either Diesel or Steam Power

Aluminum for Railway Rolling Stock Construction

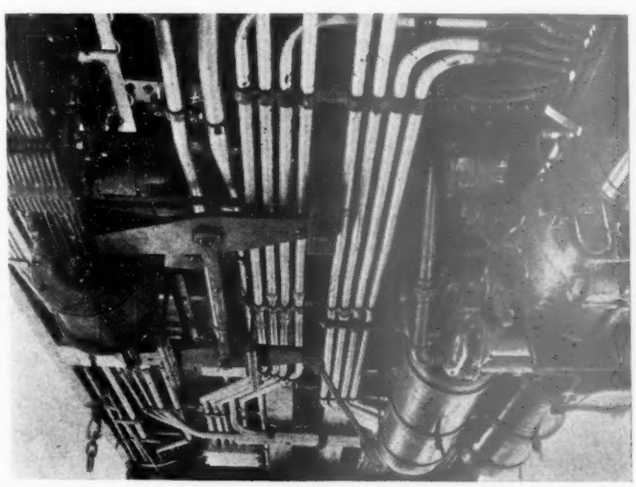
A review of thirteen years' experience with the strong alloys of the metal, both in rolled and extruded forms

By A. H. Woollen
Aluminum Company of America

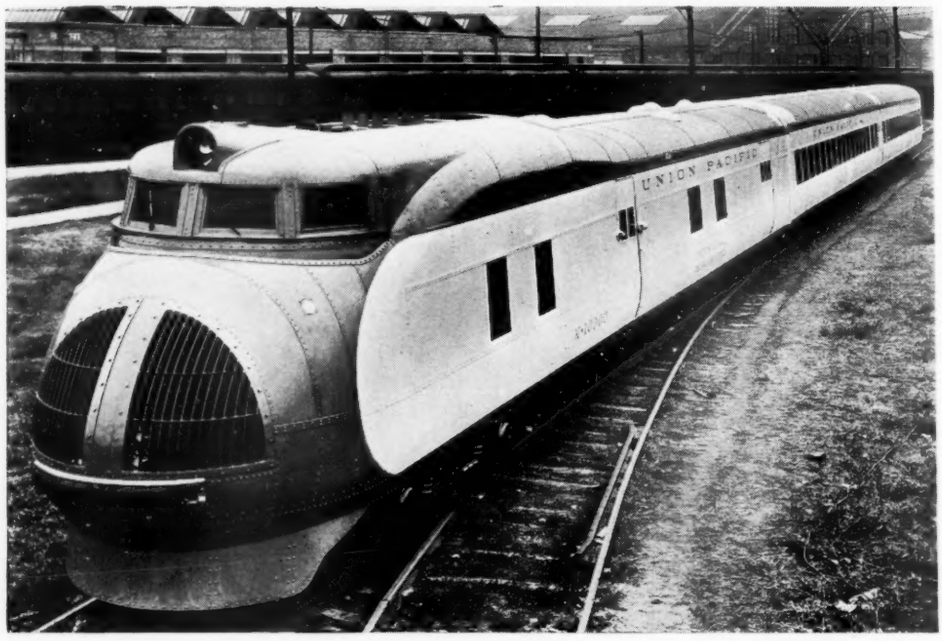
FIFTY years ago this month, Charles Martin Hall discovered the electrolytic process for the production of aluminum—a process that is the basis for the commercial production of aluminum today. Hall's discovery made possible the manufacture of the metal at a material reduction in price and, as a result, the early producers of aluminum visioned many things constructed of aluminum.

While in that connection their dreams of passenger-train and freight-train cars were not immediately realized, nevertheless, today, aluminum plays an important part in railroad rolling-stock construction. A fair appraisal of its use in this field shows a conservative but progressive development in the application of the metal rather than an attempt to launch a new material on the railroads for many diversified uses without a definite knowledge of its performance and with little research background.

While some aluminum was used in passenger-train car construction during the early part of the twentieth century, its uses were confined to the low-stressed parts of the car interior. It was primarily a period of transition from wood to steel, with the first all-steel Pullman car being exhibited at the Jamestown Exposition in 1907. Two years later, Alfred Wilm announced the development of a heat-treated strong aluminum alloy. Designed principally for use in lighter-than-air craft,



The First Extensive Use of Aluminum Conduit to Lighten the Dead Weight of Railroad Rolling Stock—An Application on the Illinois Central



The "Kansas Streamliner," the First Streamline Passenger Train to be Constructed in the United States—Built of Aluminum Alloys, This Train Was Placed in Operation on the Union Pacific on February 12, 1934

the alloy soon found application in the construction of heavier-than-air craft.

As time progressed, wood was eliminated as a car-building material. It was the age of steel, and many improvements were made in the design and construction of the cars. More luxurious appointments were employed. Increased passenger traffic demanded larger cars. In time, the weight of these cars had mounted to such an extent that weight reduction became an economic necessity. The favorable strength-weight ratio of the strong aluminum alloys had been definitely established in the aircraft industry, and it was only logical for the railroads to turn to aluminum in order to accomplish the necessary saving in weight.

While aluminum was ready for the railroads and the railroads were in need of light-weight car construction, the Aluminum Company of America, the car builders and the railroads would only proceed in the most gradual manner, testing each application before attempting a new one. The reasons for this are quite obvious: the railroads had built a safety record during the period of steel construction which could not be jeopardized; and aluminum was entering a new period in its commercial life.

First Major Application

The first major strength application for the metal came in 1923, when the Illinois Central built 25 suburban passenger-train cars with strong aluminum alloy roof sheets. Aluminum was also employed in the interior finish, doors, and conduit and boxes for electrical wiring, but these applications for the metal were so well established that they could not be considered experimental. The alloys used in these applications were well known to car builders, and the manufacturing problems involved were quite simple.

On the other hand, the roof sheets, representing an entirely new use of aluminum, required special development in manufacturing technique, application engineering and shop practice. Sheets of 17S-T alloy were employed, since they possessed approximately the same strength as the steel sheets they replaced. The economical size of sheet required by the car builder necessitated larger manufacturing equipment than then available in the works of the Aluminum Company of America, and at the outset it was essential for this company to devise means for producing the sheet. Being a heat-treated alloy with characteristics new to car builders, it was also necessary to determine the extent to which the alloy would stand the forming operations developed in ordinary steel practice. The alloy of that time had been in use for fourteen years and little difficulty was encountered in forming the roof sheets. They were assembled with steel rivets.

Shortly after the construction of the 25 suburban passenger-train cars for the Illinois Central, the Pennsylvania decided to build eight multiple-unit passenger-train cars in which aluminum alloys would be used to the maximum extent practical, necessarily limited by the aluminum fabricating equipment of that day. As a result, the entire car bodies above the side sills were constructed of aluminum alloys, with alloy 17S-T being employed for such strength members as the posts, side sheets, letter board, roof sheets and floor. Manufacturing limitations at that time made it impossible to produce the side sills in aluminum in the lengths required, and from a conservative standpoint it was considered inadvisable to splice the sills.

The railroad desired to form the metal in the same dies which were used for steel in previous cars of the same type. This decision on the part of the railroad necessitated the development of a process combining the hot-forming of the metal with heat-treatment. Alloy 17S lent itself readily to this process in that its maximum strengh was obained by a solution heat-treatment followed by a room-temperature aging treatment. Accordingly, the metal was heated to approximately 930 deg. F. and transferred to the comparatively cold dies to be quenched and hot-formed simultaneously.

Since the combination of hot-forming and heat-treatment represented an advance step in the art of working aluminum, considerable experimenting was done by both the Pennsylvania and the Aluminum Company of America before it was definitely decided to employ the material. Test specimens were cut from many experimental pieces to determine the physical properties and corrosion resistance of the hot-formed and heat-treated material. This was in 1926, and even after the decision to employ hot-formed 17S-T in the construction of the cars, test specimens were prepared and exposed under various atmospheric conditions to ascertain whether any change would occur in the material. Specimens have been tested

each year since the cars were placed in operation, and the results of these yearly tests indicate no change in the physical properties or corrosion resistance of the material. Parallel tests and tests covering even longer periods of time have been conducted by the Aluminum Research Laboratories, the Bureau of Standards, and various aeronautical laboratories; and in every instance, it has been found that the applications of aluminum alloys have been successful and have in no way "disintegrated."

The early applications of aluminum alloys in the passenger-train cars of the Illinois Central and the Pennsylvania were carefully watched by car builders and transportation engineers throughout the country, for they represented in concrete form the beginning of the light-weight movement in railroad rolling stock construction. When the Illinois Central decided to build 215 suburban passenger-train cars for its Chicago suburban electrification, there was no hesitance on its part nor on the part of the Aluminum Company of America in the use of 17S-T alloy roof sheets and in the use of unheat-treated alloys for interior finish.

Up to 1931, many additional applications were made of aluminum for the strength members, and today, more than 400 passenger-train cars are in successful operation which were built during the eight years of development.

The results obtained from the applications of aluminum in rolling stock between 1923 and 1931, combined with the intensive research developments and improvements in manufacturing facilities, indicated that the application of aluminum could be extended to the entire car body and underframe with safety.

Introduction of Structural Shapes

It soon became apparent that with the passing of the development stage in the application of aluminum alloys for passenger-train cars, further expansion of the use of light alloys could only be accomplished by greatly increasing manufacturing facilities for the production of strong aluminum alloys. The railroads and car builders required structural shapes in lengths up to 85 ft., such as could be obtained in steel. They also required large plates for center-sill cover plates in lengths up to 85 ft. so that center sills could be constructed in one length.

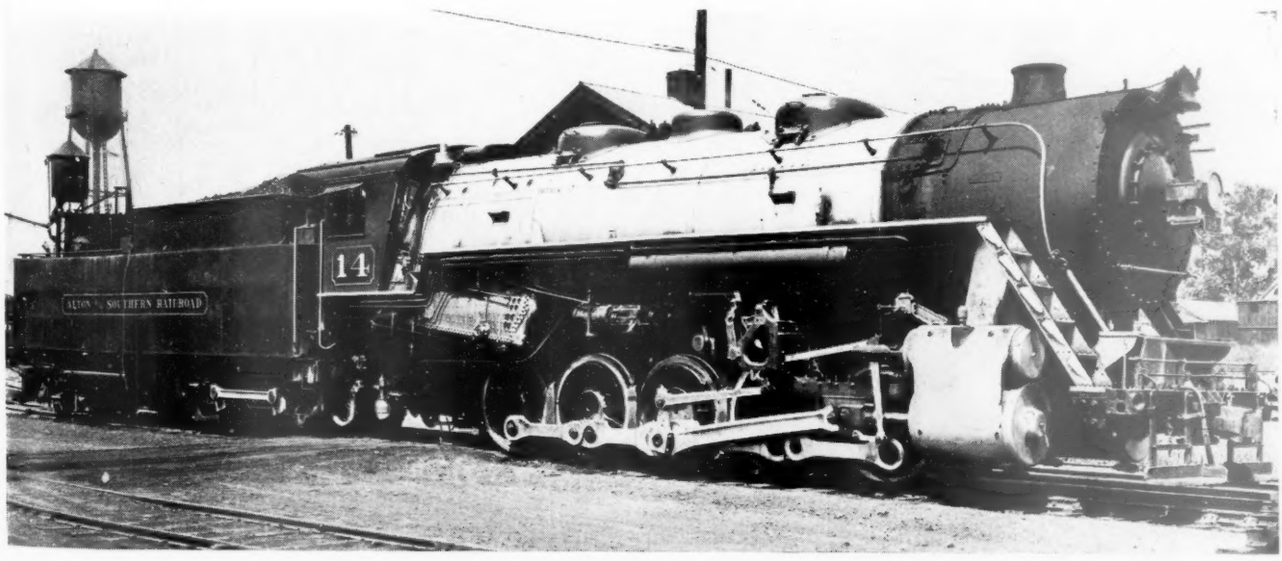
The Aluminum Company of America immediately expanded its manufacturing equipment and built at Massena, N. Y., a complete rolling mill for the production of structural shapes. This included a blooming mill with its preheating furnaces, a 26-in. merchant mill with sets of rolls for channels, angles, I-beams and similar shapes, and heat-treating and finishing equipment for these shapes.

In order to produce the large plates required, the rolling mill facilities at the Alcoa, Tenn., plate mill were increased to roll large plates of 17S-T or similar strong alloys in the lengths and widths which seemed to be indicated by the requirements of the car builders and railroads. This expansion included the necessary heat-treating, straightening and stretching equipment. These increased facilities at Massena were completed in 1930, and at Alcoa, in 1931, and the necessary experimental work conducted so that production of the shapes and plates required for the complete aluminum car were available by the end of 1932.

Even before the completion of the structural and plate mills, 35 interurban passenger cars were built for the Indiana Service Corporation by the Pullman Car and Manufacturing Corporation and the American Car and Foundry Company, with body structures and underframes completely fabricated from the strong aluminum alloys.

The requirements for the design of the Indiana cars called for material which could be pressed cold, as the sizes of pressings were such that it was impractical to heat them in one piece and press them with heat-treatment performed coincidentally with pressing. As a result, another heat-treated aluminum alloy was employed in the place of 17S, namely 51S. Alloy 51S, after solution heat-treatment, that is, 51S-W, has physical properties of sufficient magnitude so that it could be utilized in the fabrication of the strength members of the cars. In addition, it possesses the characteristics of readily being formed cold in existing equipment in the car builders' plants, provided such forming is done within two or three weeks after heat-treatment. This alloy was used for all of the formed parts of the Indiana cars, while alloy 17S-T was employed for all standard shapes. Other applications for aluminum were similar to those already standardized.

It is interesting to note that the application of the metal in the Indiana cars involved its use in the underframes and superstructures of electric multiple-unit cars which are subjected to greater fire hazard as a result of the use of electric propulsion current with ground re-



Alton & Southern Locomotive Equipped with Forged Aluminum Side and Main Rods, as well as Cab, Boiler Sheathing and Other Miscellaneous Parts

turn. Before the cars were built, it was anticipated that some ground current would return through the aluminum structure and that fires from hot motor-leads and other electrical arcs might be drawn to the aluminum structure. The experience gained in the suburban cars of the Illinois Central indicated that short circuits in the aluminum conduits on these cars tended to operate the protective apparatus in a far shorter time, because of the greater conductivity of the aluminum structure. Furthermore, the arcs drawn to the aluminum structures did not produce ionized gases and were not prolonged enough to damage the aluminum, even though its melting point is much lower than that of steel.

During the five years the Indiana cars have been in operation, there have been several short circuits and motor lead fires, but in no instance have temperatures been attained which were sufficient to cause any trouble in the aluminum structure.

The uses of aluminum in passenger-train car construction were extended even further when in 1932, an all-aluminum multiple-unit passenger-train car was constructed for suburban service on the Long Island. Besides the complete car body and underframe, the air-brake system, pipe fittings, air-brake parts and reservoirs were likewise aluminized. This car was the first to employ rolled sections from the Massena, N. Y., structural mill and the Alcoa, Tenn., plate mill, and would not have been possible in aluminum without these facilities.

Prior to the World's Fair in 1933, the Pullman Car and Manufacturing Corporation designed and built the first complete aluminum passenger-train cars and trucks. A combination sleeping-parlor-observation car and a deluxe coach with parlor observation were fabricated entirely of aluminum alloys. In the design and construction of these cars, the experience of the past ten years was drawn upon, and the cars were built for the heaviest type of railroad passenger service; that is, with full A.A.R. requirements.

Aluminum in Streamlined Trains

The high-speed streamlined train had its commercial conception in 1933, when W. A. Harriman of the Union Pacific called upon his engineers to develop a train which would combine many of the desirable features of the railroad train, the bus, the private automobile and the airplane. Their ideas were embodied in the Kansas Streamliner, which was constructed of aluminum, except for the trucks and end sills. This pioneer unit, placed in service on February 12, 1934, is now in successful operation and has led the way for a number of additional trains in aluminum, stainless steel and other recently developed alloy steels.

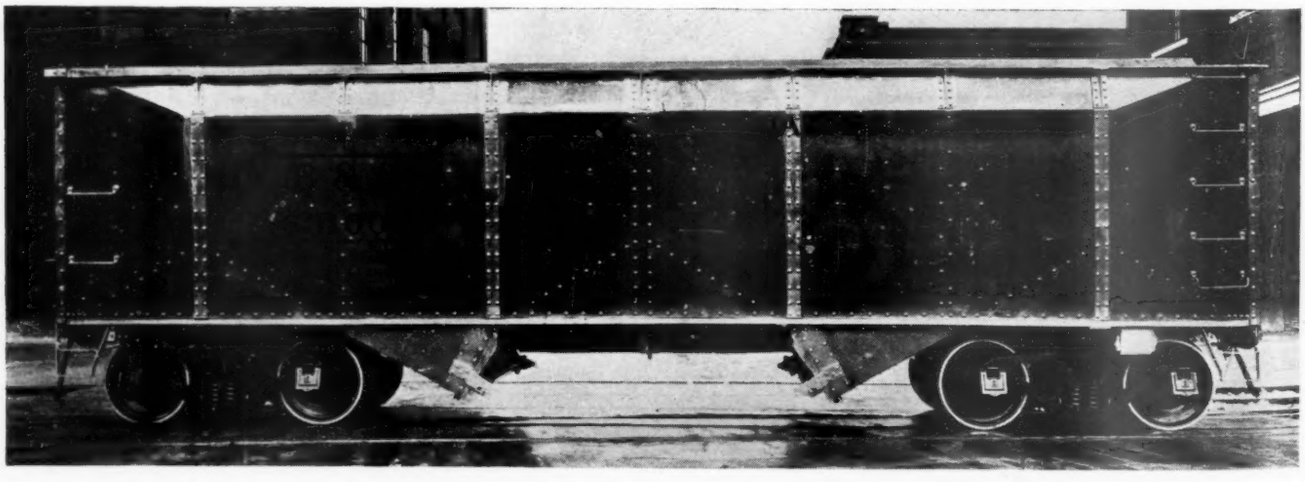
In the high-speed Diesel-powered train, weight reduction became an even greater factor than it was in the conventional type of railroad equipment. New alloys of steel gave the designer additional materials with which to work, provided cross-sections were reduced sufficiently to offset their higher specific gravity. (Aluminum has a specific gravity of 2.71; steel, a specific gravity of 7.2.)

The aluminum trains of the streamlined, high-speed type include the three- and seven-car trains of the Union Pacific, the three-car train of the New York, New Haven & Hartford, and the eight-car train of the Baltimore & Ohio. The Baltimore & Ohio train, while streamlined, differs from the other high-speed trains in that it is not a special type train hauled by a limited power plant.

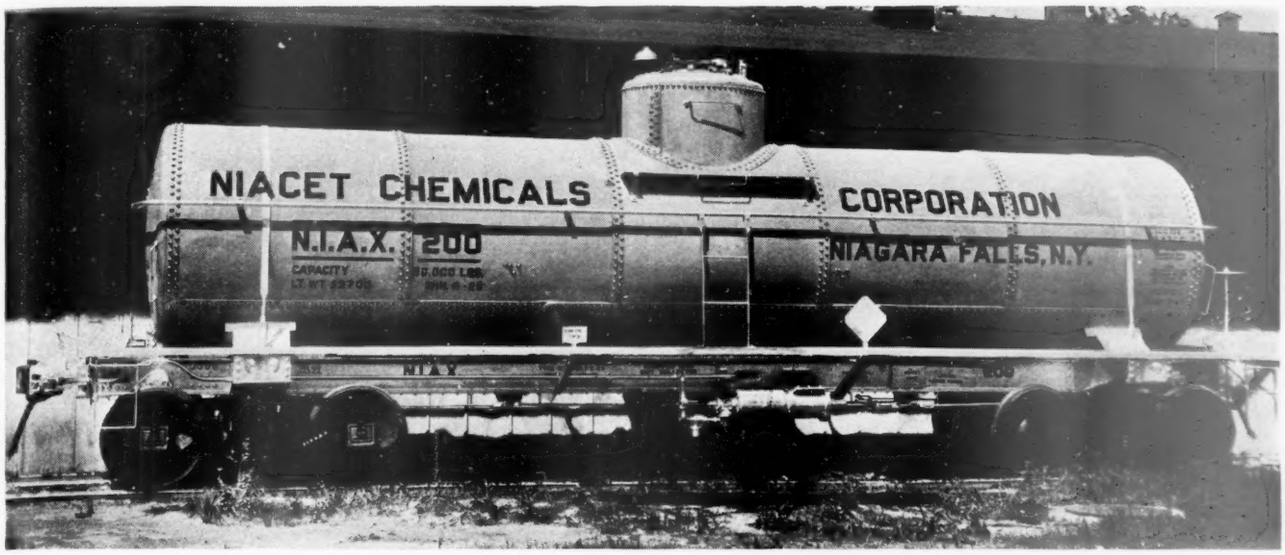
Four additional aluminum-alloy trains are now in the process of construction for the Union Pacific. There are, of course, other examples of high-speed trains, such as the stainless-steel trains of the Chicago, Burlington & Quincy and the Boston & Maine; and the Cor-Ten steel trains of the Gulf, Mobile & Northern, the Baltimore & Ohio and the Illinois Central; but even on these trains, aluminum alloys were employed for many parts of the car interior because of the background aluminum had built during its years of service on the railroads.

The aluminum-alloy trains utilize the medium strong aluminum alloys, which are comparable with mild steel. These are not newly developed alloys, but have been tried and proved in many applications in railroad rolling stock construction. They were selected primarily because of their adaptability to the new type of construction resulting from streamlined design.

The development of the hydraulic extrusion process, by which special shapes of intricate design could be made available in the lengths necessary for car building, had been going on for several years. As a result, the Aluminum Company of America was able to offer to the designers of the special type trains extruded shapes in addition to the other commodities. The combination of several parts in one shape decreased construction difficulties and consequent cost. By the use of extruded shapes, the metal distribution in a section could be made so efficiently that the naturally light weight of the aluminum alloys was even better utilized. The resulting structures were even safer and stronger. The extruded shapes took the place of many shapes formerly made by formed sheet in other materials as well as aluminum, thus permitting efficient use of the metal without danger of



This Aluminum Hopper Car Is One of a Number of Experimental Hopper Cars Built by the Baltimore & Ohio—It Possesses the Highest Pay-Load-Dead-Load Ratio of Any of the Experimental Hopper Cars



The First Aluminum Riveted Tank Car, with Five Sheets, Later Developed into a Three-Piece Tank Car by the Use of Larger Sheets

internal stresses developed through forming operations.

Car construction in the past has largely been a matter of precedent; that is, the steel car was known as a structure and, provided a few calculations were made on deflection, experience was all that was necessary to design a steel car. Experience had dictated that the highly-stressed parts were sufficiently strong to meet the requirements of the A.A.R. and there was little need for actual designing. With the advent, however, of light-weight construction, it became necessary to redesign many parts of the car structure by more accurate and modern methods.

Problems of Design

Where the design was not given careful consideration, buckles and waves developed in such locations as sheets over door openings and on side sheets. Metallurgists were sure that the metal was satisfactory, and it was soon established that the buckles were simply due to errors in calculation or unwarranted assumptions of stress distributions which overstressed the metal or caused stress concentrations which resulted in deformation of the metal. Redesign of the affected areas immediately remedied this condition and the buckles were eliminated. Scientific stress analyses of every part of the assembly became imperative in order to determine the most economical section of the material to be used.

The stress analyses developed many interesting factors, particularly with regard to the different materials employed to effect weight reduction. For example, in attempting the reduction of weight, thinner gages of metal were used for such strength members as side sheets and skin sheets, but the thinner gages failed as columns and the analyses of these structures showed that a thick sheet was necessary. The light weight of aluminum permitted the designer to employ these thicker sheets and still effect the desired weight reduction. But the fact developed that cars built in this way were far stronger as a whole while still meeting the light weight requirements, and the safety factor against the results of impact greatly increased. It also developed that while the modulus of elasticity of aluminum alloys was only one-third that of steel, deflection governed the size of many members. When the high-strength steels were used and stressed to three times that of aluminum, the deflection of these steels was the same as that of aluminum, although the cross-section of the metal was much smaller. The obvious result was the greater safety of the aluminum structure with its low-stressed parts.

While the applications for aluminum to railroad rolling stock construction have been principally from the standpoint of weight reduction, the chemical characteristics of the metal have influenced its use in tank and hopper car construction. Tank cars with tanks of aluminum alloys were built experimentally in 1928 and, after a period of trial, their value in the transportation of certain chemicals and food products was definitely established. Today, more than 100 tank cars with aluminum-alloy tanks are employed in the transportation of such commodities as glacial acetic acid, formaldehyde, hydrogen peroxide and fatty acids, making possible, for the first time, the bulk shipment of some of these chemicals. While the chemical characteristics of the metal are of primary importance, there is, of course, a worthwhile weight saving through the use of aluminum.

Nineteen thirty-one witnessed the construction of the first aluminized hopper cars, when the Canton Car Company built 10 experimental 70-ton hopper cars for the Alcoa Ore Company. It was well known that aluminum and aluminum alloys were highly resistant to the action of coal and especially high-sulphur coal, while the materials commonly used in hopper-car construction were seriously affected by the action of high sulphur coals. As in the case of tank cars, the chemical characteristics of aluminum warranted its application and there was a material reduction in the deadload-payload ratio when the aluminum alloys were employed. Weight reduction in both tank-car and hopper-car construction, however, will become a more important factor when a sufficiently large number of cars have been built and interchange regulations carefully worked out.

The Alcoa Ore Company hopper cars were built entirely of aluminum except for the couplers, draft gears and trucks, alloy 17S-T being used in the underframes and for all strength members, and alloy 4S for the hopper sheets and other parts exposed to the lading. Later, it was found that the draft-gear lug, bolster center and back-stop castings in aluminum would have to be increased in cross-section to such an extent that weight saving would be practically negligible for these parts to stand up under shock conditions. Steel castings, designed to give maximum strength consistent with weight, were later employed for these parts.

At the time the Alcoa Ore Company hopper cars were

built, three experimental hoppers were constructed at the Aluminum Research Laboratories, New Kensington, Pa., and filled with three different grades of coal that were known to be excessively corrosive to steel. Both the hopper cars and the experimental hoppers have been examined periodically, and after more than four years, their condition indicates that a minimum life of at least twenty years may be expected from hopper cars of aluminum alloy construction which are employed in the transportation of coal or even raw sulphur.

The Pennsylvania, in 1932, rebuilt one of its existing steel hopper cars, using aluminum hopper sheets. Since that time, this car has been in test service and has given satisfactory results.

The Baltimore & Ohio, in 1934, decided to build a number of test hopper cars of different materials. Of this group of cars, the one which proved to have the highest payload-deadload ratio was constructed of aluminum. All of these cars are now in test service.

Development work on locomotives of various types has been carried along simultaneously with the development work in passenger-train cars and freight-train cars. Aluminum cabs and apparatus decks for steam and electric locomotives followed the development of other rolling stock in logical sequence. In the case of the reciprocating parts of steam locomotives, however, it was necessary to go through an extensive development program. Two proving grounds were established, one on the Alton & Southern where heavy-duty switching service is continually in operation, and another on the Pennsylvania where a heavy-duty freight locomotive was equipped with forged strong aluminum-alloy main and side rods.

The applications of aluminum in the reciprocating parts of the locomotives on both the Alton & Southern and the Pennsylvania have been watched with unusual interest. Early it was found that existing designs proved inadequate and it was necessary to redesign completely both the main and side rods. In its research and development work on locomotive reciprocating parts, the Aluminum Company of America made a decided contribution to the art of the design of these parts, whether they be aluminum or steel. A satisfactory design was obtained, which today may be considered commercial.

Aluminum, with 13 years of practical experience in railroad rolling stock construction, can not be considered an experimental material for the heaviest type of passenger- and freight-train car construction. Utilizing alloys which were developed some 27 years ago and have been improved continually by intensive research and development in both constituent and manufacturing practice, the era of aluminum for car construction purposes has arrived definitely. The extent to which aluminum alloys may be employed for the construction of railroad rolling stock is limited only by the requirements of present-day engineering design; and whether rolling stock is built entirely of aluminum or this metal is used jointly with others, is determined entirely by the economical considerations which should always govern the design of rolling stock.

THE NEW ZEALAND GOVERNMENT RAILWAYS, for the year ending March 31, 1935, reported a deficit after interest charges of £1,243,395, an increase of £46,588 as compared with the 1933-34 deficit of £1,196,807. Gross 1934-35 revenues were 4.66 per cent in excess of those for the previous year but operating expenses at the same time increased by 5.59 per cent, thus leaving only £1,933 of the £295,217 gross revenue rise to be carried through as an increase in net. An increase of £48,521 in interest charges, however, more than offset this small rise in net operating revenue and thus produced the augmented deficit.

Freight Car Loading

WASHINGTON, D. C.

REVENUE freight car loading in the week ended February 8 totaled 622,097 cars, an increase of 258 cars as compared with the loading for the week before and an increase of 30,770 cars, or 5.2 per cent, as compared with the corresponding week of last year. Coal loading showed an increase of 37,568 cars as compared with last year and increases were also reported in the loading of grain and grain products, ore and coke. The summary, as compiled by the Car Service Division of the Association of American Railroads, follows:

Revenue Freight Car Loading
For Week Ended Saturday, February 8

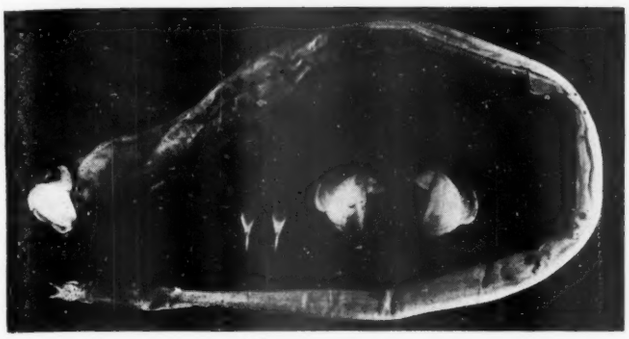
Districts	1936	1935	1934
Eastern	148,871	144,488	131,551
Allegheny	125,610	120,209	111,783
Pocahontas	50,892	44,160	44,041
Southern	89,316	87,678	92,200
Northwestern	67,571	67,609	64,943
Central Western	90,268	80,602	80,661
Southwestern	49,569	46,581	48,719
Total Western Districts	207,408	194,792	194,323
Total All Roads	622,097	591,327	573,898
Commodities			
Grain and Grain Products	28,544	25,217	31,271
Live Stock	10,431	12,571	13,734
Coal	188,289	150,721	139,484
Coke	10,907	8,904	10,183
Forest Products	24,916	25,417	21,396
Ore	5,377	3,145	2,596
Merchandise L.C.L.	147,360	154,962	160,348
Miscellaneous	206,273	210,390	194,886
February 8	622,097	591,327	573,898
February 1	621,839	596,961	565,401
January 25	584,691	555,528	563,100
January 18	611,408	562,826	561,902
January 11	615,028	553,518	557,266
Cumulative Total, 6 Weeks	3,597,047	3,357,434	3,322,380

Car Loading in Canada

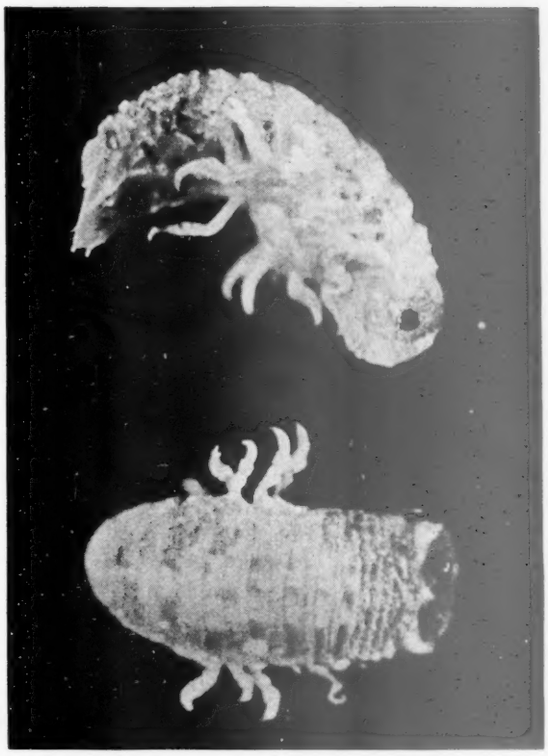
Car loadings in Canada for the week ended February 8 increased to 41,567 cars from 39,501 cars for the previous week, but were 3,313 below the total of 44,880 for the corresponding week last year, according to the compilation of the Dominion Bureau of Statistics.

	Total Cars Loaded	Total Cars Rec'd from Connections
Total for Canada:		
February 8, 1936	41,567	22,307
February 1, 1936	39,501	22,249
January 25, 1936	39,006	21,036
February 9, 1935	44,880	24,925
Cumulative Totals for Canada:		
February 8, 1936	234,835	129,926
February 9, 1936	248,806	129,539
February 10, 1934	236,835	123,641

THE FISCAL YEAR ENDED MARCH 31, 1935, was one "of great prosperity" for the South African Railways and Harbors Administration, according to the annual report recently issued. The Administration reported a 1934-35 surplus after all charges of £2,547,701 as compared with a 1933-34 surplus of £1,523,807. These results have wiped out the accumulated deficits of previous years, thus permitting the Administration to enter the fiscal year ending March 31, 1936, with a net surplus of £379,431. Railway traffic during 1934-35, the report says, "increased to a phenomenal extent"—a turn which is attributed in the main to extensive development of new mines, but also to new construction work and expanded industrial activity generally. As a result "the tonnage conveyed, passengers carried and revenue earned were the highest on record." Gross 1934-35 revenues were 14.24 per cent in excess of 1933-34, which latter had represented a 14.75 per cent increase over 1932-33. Meanwhile 1934-35 operating expenses were only 8.88 per cent in excess of 1933-34, so that the operating ratio was down from 71.4 per cent to 67.9 per cent.



Above—Teredo Navalis—The Entire Animal, Together With a Set of Shells and Pallets



Right—Enlarged View of Limnoria Lignorum, Which Are Widespread Along Practically the Entire New England Coast

North Atlantic Coast Fights New Marine Borer Attack

Special investigating committee makes first progress report on condition which will cause heavy damage if not corrected*

By Dr. Wm. F. Clapp

Consulting Biologist, Duxbury, Mass.

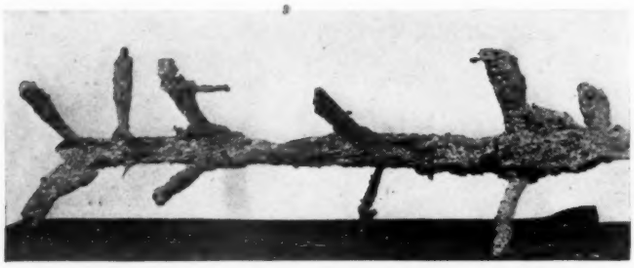
THE first intensive study of marine borer activity in this country ended a little more than ten years ago. Under the direction of Col. William G. Atwood, this investigation covered a period of two years and was conducted in a most thorough manner. The valuable information which resulted was published in 1924. Hundreds of test boards were placed in important harbors along the Atlantic coast and fortnightly examinations of blocks from these boards were made in the laboratory. These studies proved that no teredo were to be found at the north end of the Cape Cod canal, at Plymouth, Cohasset, Hull or Neponset, all on the New England coast, and that only one or two specimens were found in Boston harbor and points further north.

Test boards at the Army base in Boston in 1923 and 1924 proved that attack by marine borers was very slight at that location, and that only limnoria occurred there. Blocks submerged for a year showed very few specimens and were practically uninjured. The same was true of test blocks from many other boards in Boston harbor. Consequently, the boards were discontinued and the investigation was ended, so far as New England was concerned.

In 1933 the writer discovered a sudden and exceptionally severe attatck by teredo navalis in Plymouth harbor. This attack has resulted in the destruction of all of the wharves in this harbor in two years' time. Early in 1934, a committee was formed of representatives from most of the New England railroads and from some of the state departments of public works, to study the marine borer situation in New England waters. F. C. Shepherd, consulting engineer of the Boston and Maine at the time, was made chairman of this committee, and acted as such until his death on August 6, 1935. The writer was selected to undertake the necessary biological research. Approximately 100 test boards were placed in harbors from Eastport, Me., south to the New York state line.

The increase in attack by marine borers in New England waters is so alarming that the investigation started in 1934 is to be continued and its scope enlarged during 1936. Briefly, teredo navalis have now appeared in the previously immune Cape Cod Bay end of the Canal and are causing serious destruction in the dolphins and piling. Working north, they have appeared at Manomet, Mass., and have practically destroyed all piling in Plymouth harbor. They have invaded Scituate, Hull and Neponset, Mass. In Boston, large living specimens are to be found in practically every structure

* Taken from the first progress report of the New England Committee on Marine Piling Investigation, sponsored largely by the New England railways, which is making an exhaustive scientific study of recent marine borer activity in North Atlantic waters. The complete report, which includes 207 mimeographed pages, bound in book form, includes detailed analyses of the field and laboratory work conducted under the auspices of the committee to March 1, 1935, and also several papers on marine borer activity and the conditions affecting it in New England, prepared by Dr. Clapp, and his assistants, James Miller, Stanley Cheney and John Searles.



Pile Taken From Boston Harbor in 1935, Showing Total Destruction by Limnoria

throughout the entire open harbor. They have appeared in structures in the Saugus river and in Lynn harbor. A test block, 6 in. by 4 in. by 4 in., from a board as far north as Searsport, Me., shows several hundred teredo navalis. There is no question but that teredo navalis are working rapidly up the coast and that they are now able to thrive in numbers sufficiently great to cause serious damage in harbors in northern New England that were previously immune.

Limnoria Widespread

Limnoria have always been found along the major portion of the New England coast. Certain areas south of Cape Cod have been, and are now free from limnoria attack. But in the past limnoria have been the only destructive marine organisms north of Boston.

As already stated, test blocks submerged for one year beneath the army base in Boston, in 1923, showed only occasional specimens of limnoria and no measureable deterioration of the wood. In the present investigation, blocks under the Army base show the surface to have been completely riddled by limnoria at the end of one month. In nine months the limnoria have penetrated to a depth of 7/8 in., which means that the diameter of the block has been reduced 1¾ in. These tests are made with hard pine, the same wood used in the piling under the Army base structure.

Limnoria has a world-wide distribution. The attack in New England is new and excessive, and in places is as severe as has been recorded at any place in the world, not excepting Bermuda and the tropics. The increase in the destruction caused by limnoria at the Army base is being found throughout Boston harbor and along the entire New England coast.

During the summer of 1934, two specimens of chelura, a male and a female, another very destructive marine borer which is common in Europe, were found in test blocks received from Portsmouth, N. H. Only a few specimens, less than a dozen, have been recorded from New England during the past 70 years. This last occurrence, therefore, while interesting, was not considered to be of economic importance.

Sections of Piling Removed from Newfoundland Waters, Riddled by Teredo Navalis

In December, 1934, and January, 1935, test blocks from four localities just south of Cape Cod showed specimens of chelura, one block including 20 within one square inch. Piling removed from one of the largest wharves in Boston, when examined in the laboratory, showed countless millions of this destructive crustacean. A pile was immediately pulled in a neighboring wharf less than a quarter of a mile away and it also was found to be riddled, containing an enormous number of chelura. This wharf, already damaged by limnoria, contained a thousand chelura to one limnoria.

It is impossible to say at the present time whether or not chelura are here to stay. I am merely recording the facts in order that those interested may be aware of the situation.

Sphaeroma, another very destructive, more southern, marine crustacean, has appeared at Wareham, Mass., south of Cape Cod. In Florida and the gulf states it is a factor of the greatest importance, but it has not been a problem, as yet, in northern waters.

Bankia, a mollusk, very closely related to teredo, is plentiful as far north as Virginia. In the past, it has been introduced into New England waters, but has not survived and has not been found in the present investigation. Finally, xylophaga, a boring mollusk, capable of causing severe destruction in southern waters, has appeared in great numbers in the deeper waters of Massachusetts bay. Practically every piece of submerged timber brought in by draggers in recent months has been filled with this organism.

From this very brief summary deductions may be drawn. The numbers and species of destructive marine borers have suddenly increased greatly along the New England coast. The reason for this increase has not yet been explained satisfactorily.

Among the factors which are considered as having some bearing on the distribution of these borers are temperature, salinity, acidity, free oxygen, sulphuretted hydrogen, nitrates, nitrites and pollution. The last mentioned factor includes not only sewage, but also industrial waste, oil, catch-basin overflow, Tarvia from the roads, etc.

In the present investigation, all of these factors are being studied more extensively than in any previous investigation. Hundreds of water samples have been analyzed carefully in the laboratory and in the field. The results from this work will eventually be of the greatest value but the indications which we now have are not sufficiently well established to be of economic importance. However, I can state that the hydrogen-ion concentration does not show promise of being of any value in predicting conditions favorable or unfavorable for marine borer attack. On the other hand, graphs made from a large number of free oxygen tests show promise that this factor will be of great value in future estimates of the probable activity of the various marine borers.

Northern Migration Seems Apparent

There is, unquestionably, a northern wave of many invertebrates in the sea; the lady crab, the blue crab and scores of other marine organisms have been found recently for the first time in Massachusetts bay, north of Cape Cod. On the land, termites have recently become firmly entrenched in New England and are causing damage which will not be fully realized by home owners for another year or so. There must be some condition, or combination of conditions, which can be considered responsible for this northern migration. It is our effort to endeavor to discover the cause. If this

apparent northern migration is a fact, is it not within reason to expect that sphaeroma and bankia may also become factors which must be considered in New England?

Temperature and Pollution Considered

Temperature records covering any considerable period of time are difficult to secure. Temperature has a very considerable bearing on the distribution of teredo, due to the narrow range necessary during the summer breeding season. But temperature factors have little or no bearing on chelura or limnoria. Nevertheless, studies have been made of the temperature records which are available for the last 40 years, and there is some evidence to show that there has been a slight increase in the inshore summer temperatures during the breeding season in the last few years.

Pollution did not appear to be a very important factor in the investigation a decade ago. At that time no marine borers or other marine organisms were to be found in Lynn harbor. Pollution now seems to have some bearing on the problem. A few years ago a considerable portion of the sewage was diverted from Lynn harbor. Now, both limnoria and teredo have appeared and are causing serious trouble in this harbor.

Pollution in our harbors must be eliminated. Public health demands this action. Yet, this elimination invites the destruction of marine property, which we must now be prepared to combat.

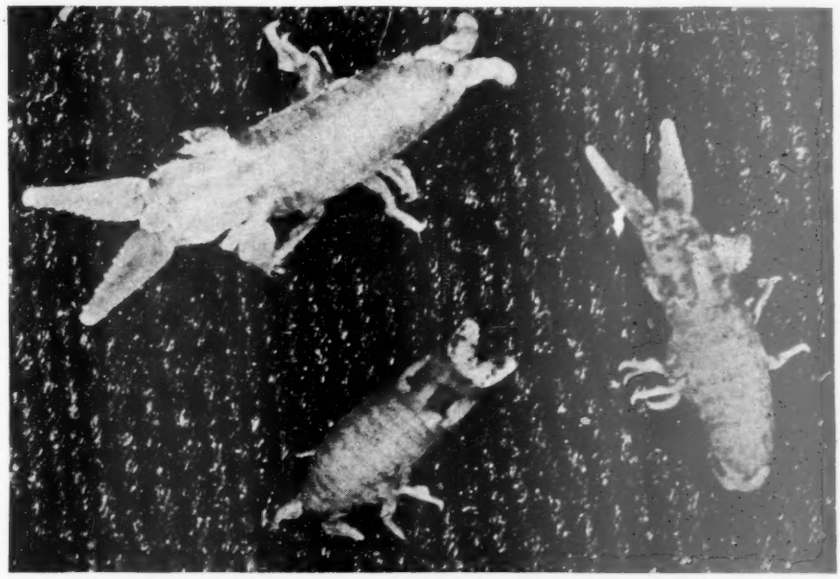
Untreated Timber Seen as Factor

As I have stated before, the exact cause for the recent invasion of borers into New England waters is not known. I have mentioned increased temperature and other water conditions. There is another factor which may have more bearing. I find that some 50,000 or 60,000 untreated pine piles were placed in Boston harbor between 1915 and 1920. Oak piles have always been considered good for a score of years or more. In Boston harbor, hard pine is attacked much more readily than oak, and spruce is even less resistant. There is some reason to believe that the placing of so much untreated timber in Boston harbor has furnished a readily available home and food supply for the marine borers. They have, therefore, multiplied enormously and have spread to structures previously uncontaminated.

Is it not within reason to insist on control by law, to prevent the building of timber marine structures unless they are properly treated or otherwise constructed to resist attack by marine borers. No one could be criticized justly for using untreated timber in Boston harbor a decade ago, for it had given good service in the past. Remarkable changes have now taken place, however, in our harbors and the cautious builder will insist on the elimination of untreated wood.

Test boards were originally designed as traps to discover what species were responsible for timber destruction. They have now been found to be of even greater value as indicators of marine borer activity. It is conceded by all concerned that if test boards had been kept in service under the Army base at Boston, the sudden unexpected attack would have been recorded on the blocks. Repairs which are now contemplated would have been completed two or three years ago, and at one-tenth of the cost now estimated, which is probably only a fraction of the amount which will be required eventually. As insurance, I strongly recommend the installation of one or another of the standard test boards in localities where attack is feared.

In connection with a study of the general problem, testing grounds have been established where every possible method and material for protecting marine structures may be tested by exposure to severe attack by marine borers. The department of Public Works of the State of Massachusetts has given every possible assistance in establishing and maintaining a New England testing ground. For carrying out rapid tests in tropical waters, the United Fruit Company and others have volunteered invaluable assistance. Scores of samples, protected with material for which claims have been made, are being submerged in these testing grounds for actual exposure tests.



Enlarged View of Two Males and a Female Chelura Terebrans Taken From Shaw's Cove, New London, Conn., 1935

THE SOUTH AUSTRALIAN GOVERNMENT RAILWAYS reported for the year ended June 30, 1935, a deficit of £794,465, after interest and all other charges, as compared with a 1933-34 deficit of £840,711. The improvement as compared with the previous year was due to an increase of about £100,000 in gross revenues and a reduction of approximately £60,000 in interest charges, which favorable factors were only partially offset by a £69,000 increase in operating expenses, resulting from wage awards, a £20,000 increase in sinking fund charges and an £8,000 rise in pension costs.

Motive Power for High-Speed Operation*

A study outlining the conditions of speed, train weight and grade which govern selection of locomotives

By Charles Kerr, Jr.

Transportation Engineer, Westinghouse Electric & Manufacturing Company

THE favorable reception accorded to non-rail transport agencies can be traced to the fact that they have brought to the transportation field certain new concepts of comfort, convenience and service. We feel confident that the railroads can meet this competition, and that by so doing they will continue to be the dominant form of transport for some 75-80 per cent of the ton miles moved in this country. However, they can only maintain this ratio by providing standards of comfort, speed and service never approached in the past. When this fact is fully appreciated, we may look for these developments to take place at an accelerated pace commensurate with the present accelerated pace of all mechanical developments.

The elements of this improved rail service will be many, among which are air conditioning, improved conveniences, easier riding vehicles, better roadbeds, etc. But however extensive these may be, they will not completely provide the standard of transportation service demanded by the American public unless they be accompanied by greatly increased speeds, both passenger and freight.

60 M.P.H. for Freight and 100 M.P.H. for Passenger Trains

To provide the means for making possible these higher speeds is the function of motive power. Its duty is to move the traffic economically and expeditiously. About one-third of all operating expenses are directly affected by it, another third indirectly so affected; while the maximum potential speed of operation is entirely controlled by it.

The present developments in motive power and its operation clearly show the trends of future developments. Practically all passenger and freight schedules have been accelerated. Freight trains are almost entirely scheduled movements on many roads. High speed trains have been introduced. The main traffic route of the Eastern seaboard with its dense traffic and large trains has been electrified, and is operated on schedules previously unattainable. These performances are doubtless only forerunners of things to come, so that the next decade will see such operation of not a few trains nor a few routes, but all freight and passenger traffic on our main rail arteries.

It appears inevitable that the operating standards of the American railroads will soon be 100-110 m.p.h. or even higher for passenger trains, and 60-70 m.p.h. for freight traffic. The motive power and rolling stock are today available to operate at these speeds, their safety and feasibility have been demonstrated; so, with a public demand for the most expeditious service, their wholesale adoption as standard railroad practice should be merely a question of time. Furthermore, many railroad executives are today thinking in these terms for the not distant future.

In anticipation of these developments, the railway department of the Westinghouse company has been engaged continuously in making an analysis of the various fac-

* Abstract of a paper presented before the New York Railroad Club. Friday, February 14.

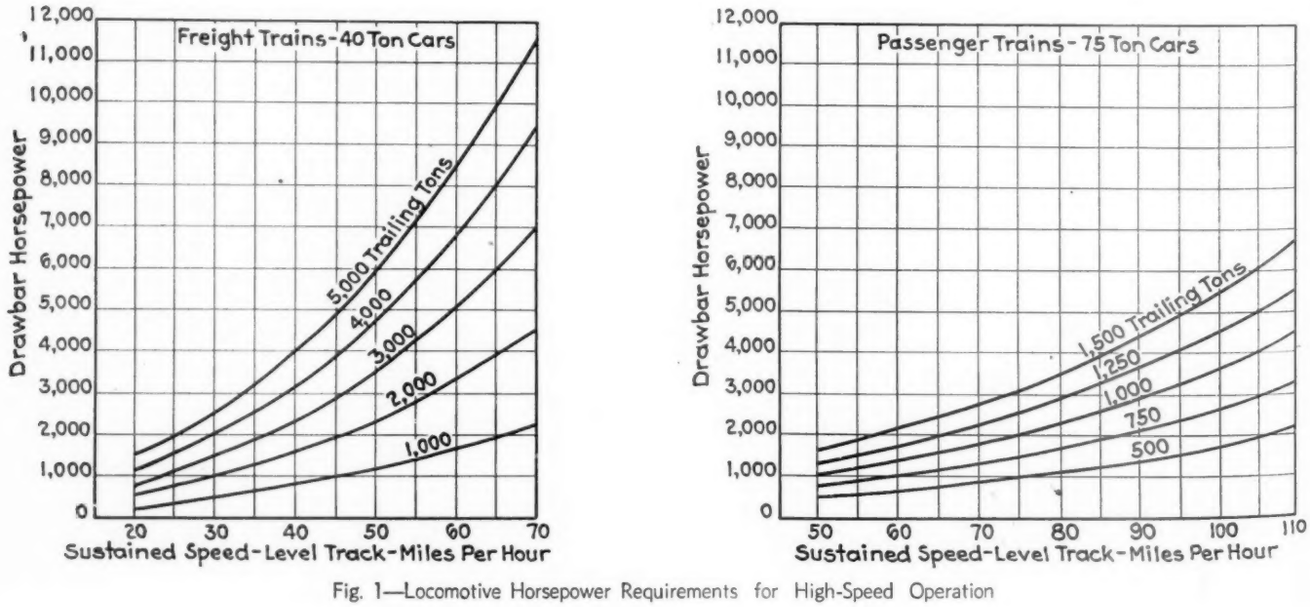


Fig. 1—Locomotive Horsepower Requirements for High-Speed Operation

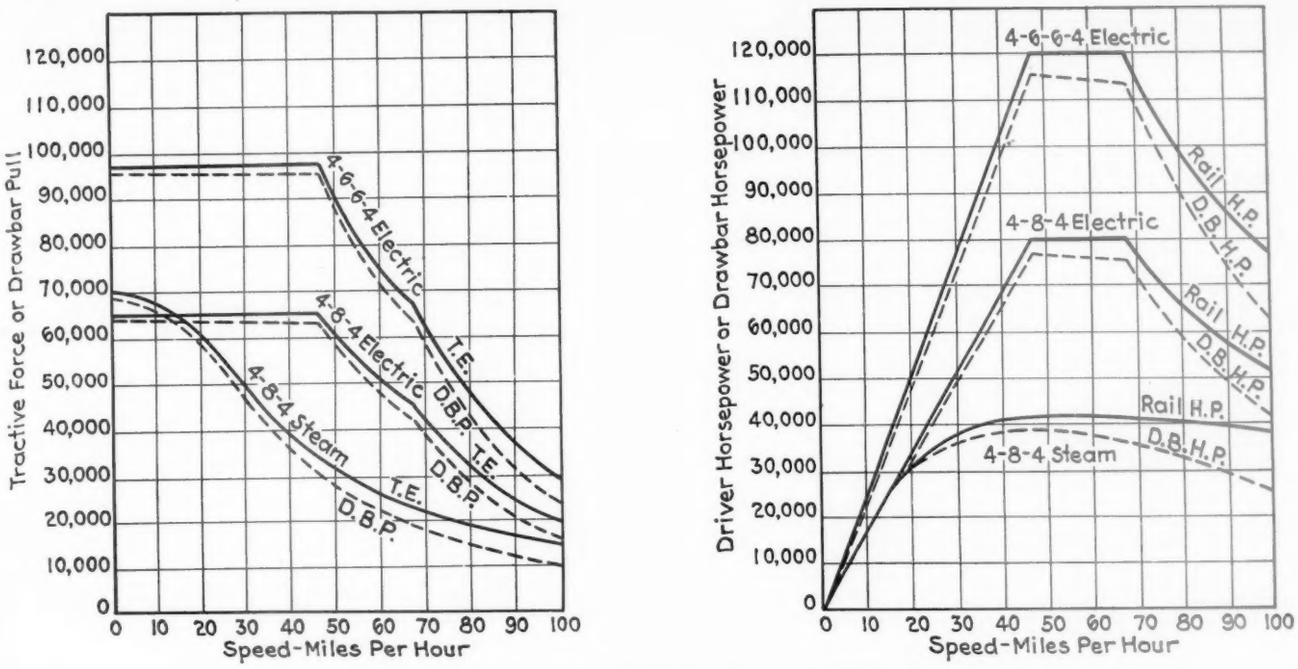


Fig. 2—Comparative Locomotive Performance—Steam and Electric Locomotives

LOCOMOTIVE WEIGHTS

	Total	Per Driving Axle
4-8-4 Steam locomotive and tender	390 tons	70,000 lb.
4-8-4 Electric locomotive	200 tons	60,000 lb.
4-6-6-4 Electric locomotive	260 tons	60,000 lb.

tors which determine the economic application of motive power to the railroad network of this country. As would be expected, this analysis has indicated a field for steam, for electric and for Diesel-electric power, and furthermore that there is ample use for all. However, we have carried our studies to far more specific conclusions, and in this presentation are offering a summary of our work for whatever benefit it may be.

An entirely new conception of the requirements of a locomotive is necessary to meet the higher operating speeds of the future. Motive power capacity will be greatly increased. In many cases, the requirements will exceed the capacities which can be economically developed with certain existing forms of motive power. Fig. 1 illustrates these locomotive requirements by showing the drawbar horsepower which must be concentrated at the head end of various sizes of passenger and freight trains for certain sustained operating speeds on level track. These curves show drawbar horsepower, and so to obtain the requirements at the locomotive drivers, or what is commonly termed rail horsepower, the necessary power to move the motive power itself must be added. This is an appreciable factor. From the curves, it can be seen that the power concentration increases more rapidly than the speed, and roughly, this relationship between speed and horsepower demands four times the horsepower when the speed is doubled.

Reduction of Train Weight Will Take Time

In view of the recent introduction of light weight trains and streamlining, there may be offered certain criticisms of the use of these curves, which are based on standard rolling stock. However, in the first place, these features can only be employed extensively in passenger service, and have no application of any great magnitude in freight service. Secondly, a general replacement of existing passenger equipment can hardly be justified by weight saving alone, so that the day of universal use of light weight equipment would appear remote. Thirdly, streamlining alone has a very limited influence on the capacity of the motive power necessary to perform a given schedule at a given maximum speed when the overall profile is taken into consideration. In other words, existing grades nullify its advantages in reducing the locomotive capacity.

That the introduction of these high speeds will revolutionize motive power can hardly be denied. The average railroad today has a maximum freight operation under 45 m.p.h., and passenger under 70 m.p.h. The motive power in use, when loaded at its rated tonnage, will seldom operate the trains in excess of these speeds, and generally at much lower speeds. Cases can be cited where the most modern of steam power is now operated so that freight locomotives handle their rated tonnages on level track at only 35 m.p.h., providing schedules between terminals under 20 m.p.h.

15,000 Horsepower per Train

When schedules are accelerated, locomotive requirements will no longer be in the order of 2,500-4,000 hp. for freight operations, but increased to the point where 10,000-15,000 hp. per train must be provided as the maximum requirement. Similarly, 6,000-8,000 hp. as a maximum requirement will exist for heavy passenger service. These estimates of motive power capacities do not represent idle dreams, for five railroads already have motive power of this order; and this is merely a forerunner of a more widespread super-standard of railroad performance. Thus, motive power purchased today should be considered in the light of the more severe demands of the future.

Fig. 2 shows the performance of the modern steam and electric locomotives, and thereby furnishes a criterion for judging motive power suitable to meet future operating requirements. The steam curve illustrates the performance of a modern four-driving-axle locomotive. A steam locomotive is subjected to various firing condi-

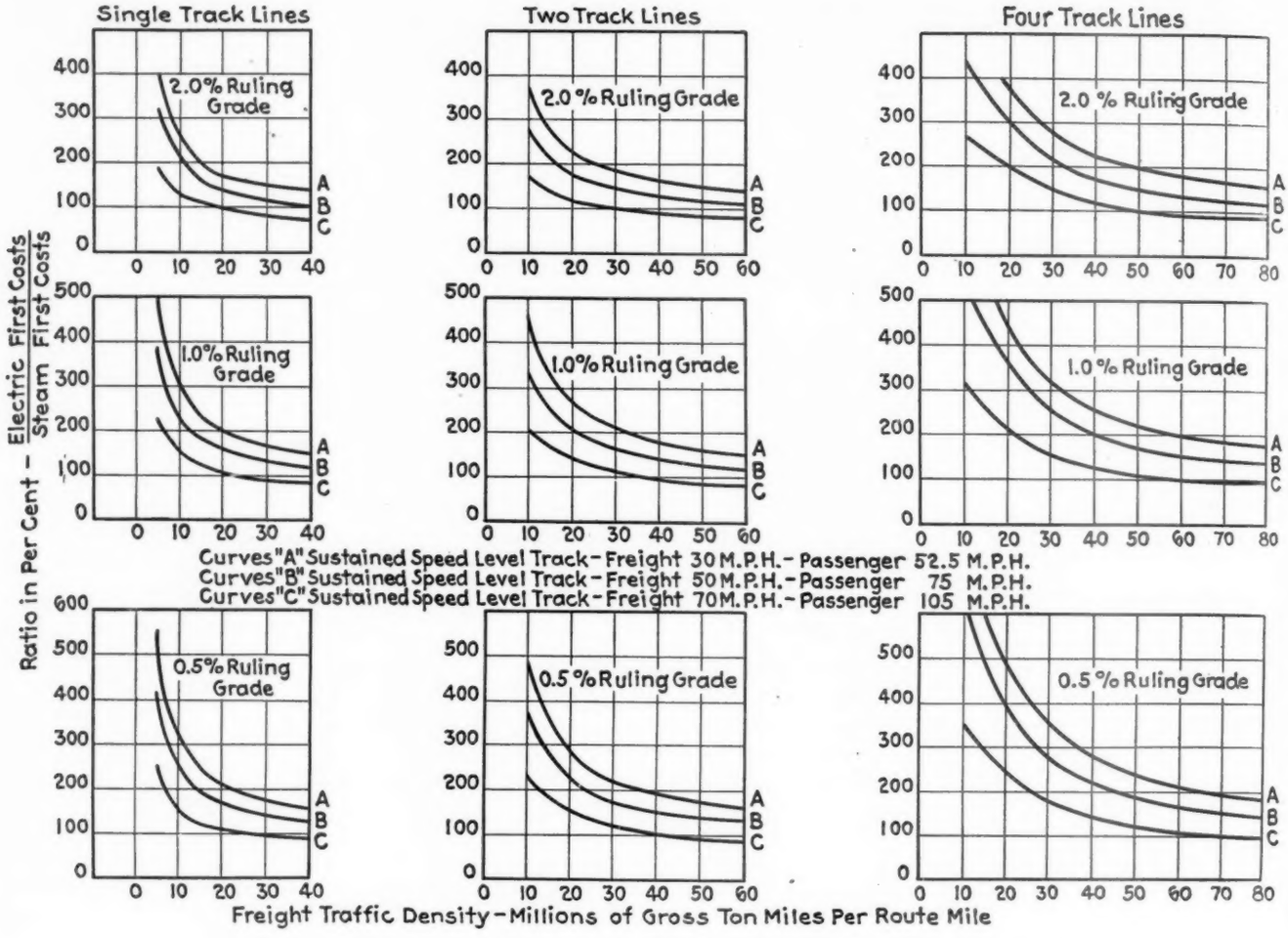

Single Track Lines
Two Track Lines
Four Track Lines
2.0% Ruling Grade
1.0% Ruling Grade
0.5% Ruling Grade
Ratio in Per Cent – Electric First Costs / Steam First Costs
Curves "A" Sustained Speed Level Track – Freight 30 M.P.H. – Passenger 52.5 M.P.H.
Curves "B" Sustained Speed Level Track – Freight 50 M.P.H. – Passenger 75 M.P.H.
Curves "C" Sustained Speed Level Track – Freight 70 M.P.H. – Passenger 105 M.P.H.
Freight Traffic Density – Millions of Gross Ton Miles Per Route Mile

Fig. 3—General Comparison of Relative First Cost—Steam Motive Power and Electrification

tions and weather conditions, so that its theoretical maximum performance cannot be averaged throughout the year. Common practice is to assume 85-90 per cent of the theoretical performance shown in Fig. 2 as the average road performance; thus the curve presented shows the steam locomotive in an optimistic light.

The maximum output shown for a 4-8-4 electric locomotive applies to a locomotive built and in service. While the so-called continuous rating of this locomotive has not been shown, this rating can be varied over a wide range to enable the maximum output to be effectively used over practically any profile. In the case of the 4-8-4 locomotive illustrated, the continuous rating is in excess of 5,000 hp.

A 4-6-6-4 locomotive, employing the same motors as the 4-8-4 locomotive, and providing 50 per cent greater capacity, is also illustrated. While this locomotive has not been built it would employ existing equipment and requires no new development. In fact, electrical apparatus is available today to deliver maximum outputs of 2,500-3,000 hp. per driving axle, and continuous outputs of 1,750 hp. per driving axle. Thus, in reality, the only limitation to the performance of an electric locomotive at any speed from zero to 125 m.p.h. is rail adhesion, not the equipment.

Diesel Power Not Likely for Heavy High-Speed Trains

The largest Diesel electric locomotive in main line service is a 3,600 hp. locomotive, built in two cabs. This type of power is in the development stage, and larger units will undoubtedly be produced in the future. However, we do not expect to see units comparable in capacity to the electric locomotive.

To operate at the high speeds which are fast approaching, three types of motive power are available. Which should be used in any particular application is a function of several variables. The principal ones are, (a) density of traffic, both freight and passenger; (b) desired speed of operation; (c) grade conditions; (d) relative costs of fuel and power; (e) number of tracks. Generally speaking, in regard to first cost of equipment, electrification is the most expensive, steam power the least expensive; but in operating expenses, the reverse is true. Thus, certain lines should be electrically operated, some steam operated, and some Diesel electric operated. We have attempted to define the points of demarcation, and are presenting our summarised conclusions in three charts.

For simplication, these charts compare electric and steam operation. In its present state of development, the Diesel electric locomotive is a competitor of the steam locomotive, but wherever the traffic concentration is sufficient to justify electrification, we do not believe that in general the Diesel electric locomotive is economically justified. However, this statement is in no way intended to minimze the importance of the Diesel electric locomotive which has a tremendous field in switching service alone, supplemented by other applications for it where the traffic is too light to justify electrification.

Fig. 3 shows the relative first costs of steam motive power and of electrification for various densities of traffic, speeds, grades and number of tracks. The steam costs

include only new locomotives; the electric costs include motive power and roadway equipment (trolley, transmission, substations and signal changes).

Electric Motive Power Cheap When Demands are Great

These curves show that the relative first cost of electrification rapidly decreases and approaches that of new steam power as the density of traffic increases, the speed increases and the grades become more severe. Thus, dense traffic, high speed and severe grades make for economical electrification. Irrespective of the speeds operated or the grades encountered, a certain density of traffic is necessary to reduce the ratio of first costs to the point where electrification can become economical. If high speeds are involved, the first cost of electrification more rapidly approaches that of steam power, and reaches a reasonable ratio to that of steam at a much lower traffic density. Thus, the popular conception that electrification in all cases is excessive in first cost, is erroneous. For future high-speed operation over the heavy traffic routes of the country, the first cost of electrification will be comparable with the first cost of new steam power.

As pointed out, electrification is only justifiable on the heavier density lines, for without density of traffic, the fixed charges cannot be absorbed. Fig. 4 shows for various sustained speeds, ruling grades and number of tracks, the density of traffic at which electrification becomes economical with present average coal and power costs. This chart is worthy of considerable study.

The curves represent the minimum density at which the annual expenses of steam power and electrification, including all fixed charges on each, are equal. For densities lower than those shown by the curves, electrification is not economical. As densities become higher than those shown by the curves, electrification becomes increasingly economical. The curves take into account speed, density, grade and number of tracks, and furthermore cover the extreme variations in these factors encountered on Class I railroads. Thus, in general, they are applicable to the entire rail system of America.

Charts Indicate When Studies are Justified

The basis for the curves in Fig. 4 are the best operating figures that we have been able to collect. We believe that the figures shown represent the dividing line between the fields of steam and electric operation as closely as it is possible to carry a general analysis of this kind. The charts have been compared with detailed application studies made over a period of years on particular projects, and in each case the general charts shown above agree quite closely with the detailed studies.

In reference to Figs. 3 and 4, a brief explanation of a few of the terms may be warranted. In any study of this nature, some consistent means of comparing relative performance must be employed. We have selected sustained operating speed on level track to serve this function because this factor furnishes a definite measurement of locomotive capacity. As such, it also furnishes a definite comparison of performance over any profile, for the ultimate speed of operation, irrespective of grades, is determined by locomotive capacity.

The variable offering the greatest difficulty in a general analysis applicable to universal use is ruling grade. No two railroads have identical profiles although they may have identical ruling grades. The nature and dis-

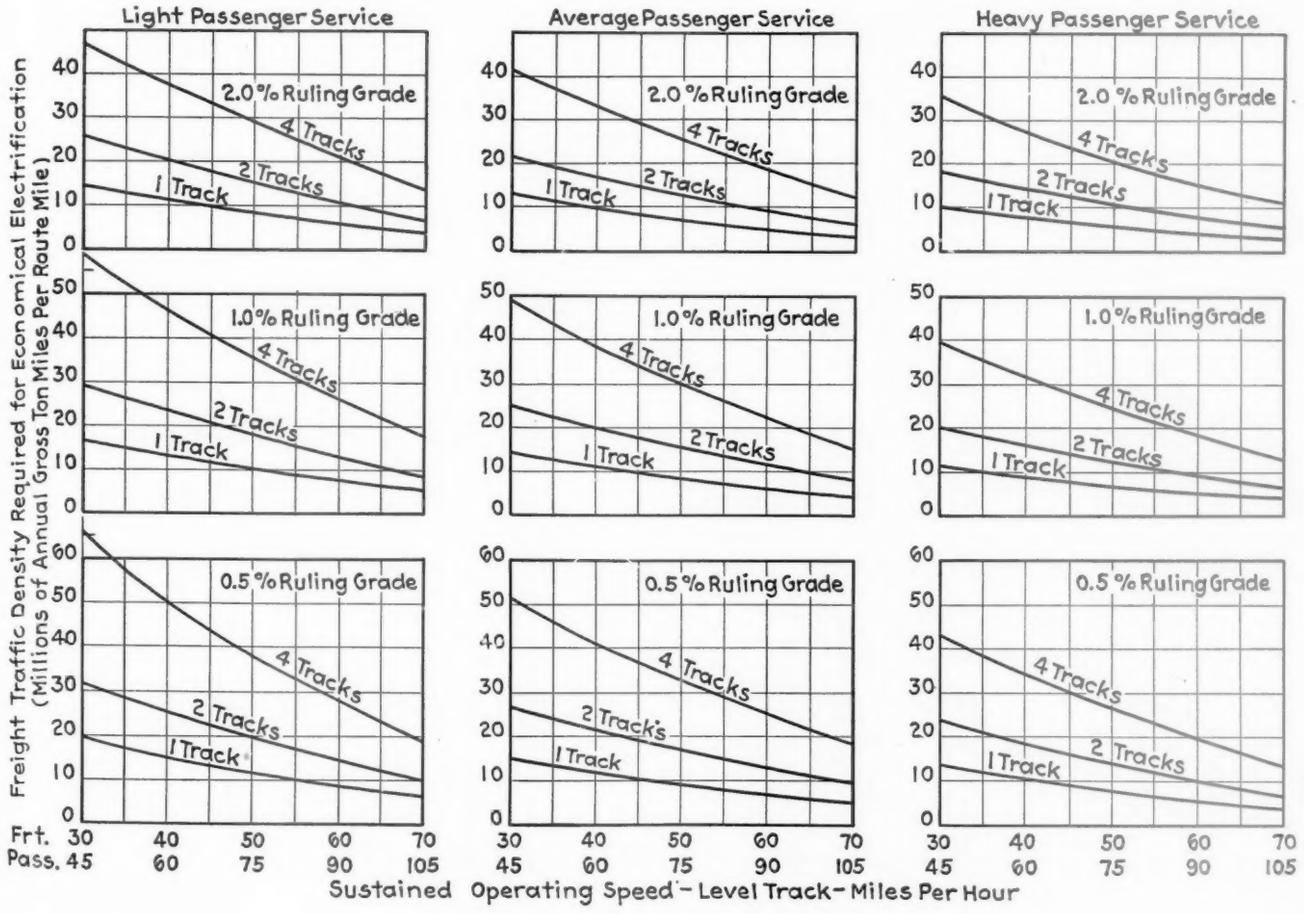

Light Passenger Service
Average Passenger Service
Heavy Passenger Service
2.0 % Ruling Grade
1.0 % Ruling Grade
0.5 % Ruling Grade
4 Tracks
2 Tracks
1 Track
Freight Traffic Density Required for Economical Electrification (Millions of Annual Gross Ton Miles Per Route Mile)
Frt. 30 40 50 60 70
Pass. 45 60 75 90 105
Sustained Operating Speed - Level Track - Miles Per Hour

Fig. 4—The General Economic Field for Electrification

tribution of these grades affect the amount of locomotive helper service required or if helpers are not used, the train tonnage. Thus, the profile has a material effect on operating expenses. For this analysis, we have taken average values arrived at from a study of operating conditions on a number of railroads. The averages taken are considered to be quite typical of general conditions.

In all estimates relative to the first cost of electrification, costs have been included for yard and riding tracks in the approximate ratio of 0.4 to 0.5 miles of auxiliary track for each main track mile. On many electrifications, this ratio may be materially decreased.

As the curves in Fig. 4 illustrate, the exact density at which electrification becomes economical is dependent upon several factors. Fig. 5 shows the relative density of freight traffic required to justify electrification as affected by (a) ruling grade, (b) density of passenger service, (c) relative cost of coal and power, (d) number of tracks and (e) speed of operation. The factors of

power by types can be ascertained. In general, the rail traffic of the country is distributed as follows:

	Per Cent of Total Route Mileage	Per Cent of Total Ton Miles
Heavy Traffic Lines	10	50
Medium Traffic Lines	40	40
Light Traffic Lines	50	10

Naturally, the heavy traffic lines constitute those routes where the greatest developments can be expected, for over them the traffic is sufficiently heavy to warrant expenditures for improvement now.

Those portions of the heaviest traffic lines with unusually dense traffic or difficult operating conditions, and all portions of the heavier traffic lines with high operating speeds constitute the field for electrification. The remainder of the mileage of the country constitutes the field of steam and Diesel electric power.

The railroads are faced with motive power purchases on a large scale. The power purchased today should be suitable for at least a 20-year life. Before it is purchased, the requirements over its normal life should be thoroughly evaluated, giving due consideration to future standards which will demand speeds over the dense traffic lines of 60-70 miles per hour for freight and 100-110 miles per hour for passenger trains, and improved service over all lines. Then let each type of power stand or fall on its merits.

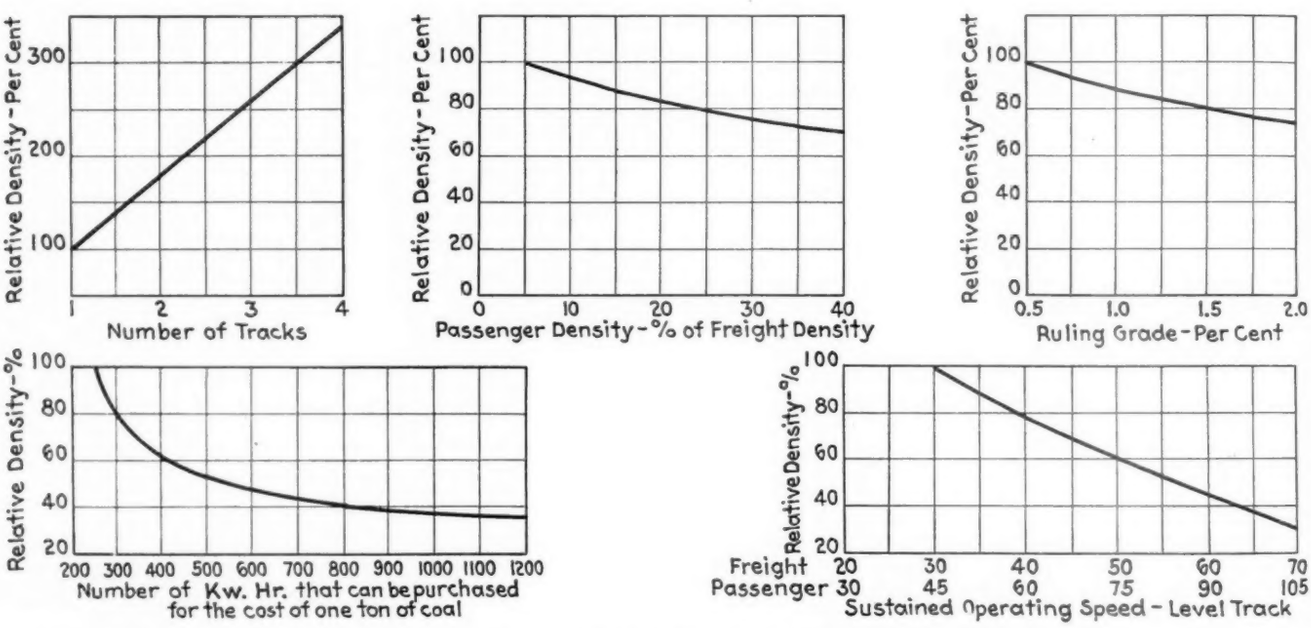

Relative Density - Per Cent
Number of Tracks
Passenger Density - % of Freight Density
Ruling Grade - Per Cent
Relative Density - %
Number of Kw. Hr. that can be purchased for the cost of one ton of coal
Freight
Passenger
Sustained Operating Speed - Level Track

Fig. 5—Effect of Several Variable Factors on the Economic Field of Electrification—Traffic Density Values, in All Cases, Represent the Relative Densities Required for Economic Electrification

greatest importance are the relative costs of fuel and power, speed, and number of tracks.

During the past two decades, the central station industry has materially reduced the cost of power through improvements in its plant and farsighted developments. The future, no doubt, will see a further continuation of this trend, the result of which will be a broadening field for electrification.

But the outstanding factor is speed of operation. As shown by Fig. 5, doubling the speed reduces the density required for economical electrification by from 55 to 67 per cent. Thus, for the high-speed rail operation of the future, electrification will play a continually increasing part. While it would be folly to advocate electric operation except in special cases for any but the main traffic arteries moving dense traffic, a continued and increasing trend towards electrification can be expected in the future.

These charts form an excellent basis for evaluating the merits of future motive power purchases. When considered in connection with a traffic map of the United States, the ultimate economical distribution of motive

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THE WESTERN AUSTRALIAN GOVERNMENT RAILWAYS, for the year ended June 30, 1935, reported a deficit after interest charges of £99,474—an improvement of £176,170 as compared with the 1933-34 deficit of £275,644. This showing which, the report says, "cannot be regarded as unsatisfactory" was due to the fact that half of the £392,524 gross revenue rise was carried through to net; gross increased 13.45 per cent, whereas the accompanying rise in operating expenses amounted to only 8.97 per cent. The report notes with satisfaction the recovery during 1934-35 of much freight traffic which had in previous years been lost because of "the unbridled competition set up by motor trucks"; the turn in this connection, it adds, was the result of highway carrier regulation which recently became effective.

Large Savings Claimed for Chicago Terminal Co-ordination

Federal Co-ordinator's assistant, in final report, estimates reduced costs of ten million dollars annually

A SAVING of $10,502,245 yearly can be made by the co-ordination of Chicago terminals, according to a report just issued by V. V. Boatner, director, section of regional co-ordination, for the Federal Co-ordinator of Transportation. This three-volume document proposes a drastic reduction in the number of major yards in the Chicago terminal and a consolidation of passenger station and l.c.l. facilities.

The report is signed by Mr. Boatner as chairman of the Chicago Terminal Co-ordinating committee. The conclusions in the report, however, are not those of the active railway officers on the committee, for an executive committee of this terminal committee, consisting of T. W. Evans, H. E. Newcomet, W. W. K. Sparrow and F. L. Thompson, vice-presidents, respectively, of the New York Central, the Pennsylvania, the Chicago, Milwaukee, St. Paul & Pacific and the Illinois Central, objects to several of the principal conclusions. These objections are quoted later.

Major Yards

One of the outstanding recommendations in the report is the reduction in the number of major yards from 21 to 8. It is planned to make up and break up all road trains for all of the roads entering Chicago in these eight yards which, it is claimed, will bring about a reduction of 20 per cent in yard forces and 27 per cent in yard engine hours performing the yard service proper. The total saving, including mechanical operations and the decrease in road train-mile costs, is estimated at $3,484,454 per annum.

The eight yards selected and the proposed division of terminal operations among them by railroads are as follows:

*Bensenville-Proviso	Chicago & North Western Chicago, Milwaukee, St. Paul & Pacific Minneapolis, St. Paul & Sault Ste. Marie
Cicero	Chicago, Burlington & Quincy Chicago Great Western Illinois Central—West
59th Street	Pennsylvania—both divisions Wabash—both divisions
Clearing	Alton Atchison, Topeka & Santa Fe Baltimore & Ohio Chicago & Eastern Illinois Chicago, Rock Island & Pacific Grand Trunk Western
*Blue Island-Gibson	Chesapeake & Ohio Chicago, Indianapolis & Louisville Erie Michigan Central New York Central New York, Chicago & St. Louis Pere Marquette
Markham	Illinois Central—South

* Double-unit yards under single supervision.

Mr. Boatner supports his selection of the yards in question with 141 exhibits dealing with every phase of the operations.

Industrial Yards

Eighteen additional yards have been designated as industrial yards under the co-ordinated plan, as follows:

Galewood	Ashland Avenue
40th Street	83rd Street
Western Avenue—C.M.St. P & P.	Englewood
Homan Avenue	South Chicago
Roby Street	Colehour
Western Avenue—C.B. & Q.	Osborne
Wood Street	East Chicago
22nd-26th Street	Barr
Congress Street	Kirk

In addition, the yards of the Chicago & North Western and the Chicago, Milwaukee, St. Paul & Pacific would be continued in operation as at present because of the highly specialized service rendered.

These yards were selected as having sufficient volume of traffic to effect concentration of movements to and from such yards with a saving estimated at $955,608 per year. The saving in switch engine hours is estimated to be 22 per cent.

The report continues:

The item of industrial switching has been arbitrarily placed at 10 per cent of the present number of switch engine hours employed on the test day. The saving is estimated at $486,062. The largest saving in switch engine time comes in transfer and interchange switching, due to the fact that the concentration of business, in both the major and industrial yards, permits much heavier train loading than is possible under individual operation. This item is further increased because of the elimination, in all estimates, of circuitous routing and the entire elimination of intermediate handling. The saving is estimated at $3,169,952. Attention is directed to the fact that a safety factor of 30 per cent is carried in the estimate of switch engine time required. The per cent of switch engine hours eliminated, comparing the proposed operation with the test day operation, is approximately 57 per cent. An elaborate set of charts and diagrams are included in this section of the report and much detail work was done in the development of the proposed operation.

L.c.l. Traffic

The section of the report devoted to the co-ordination of l.c.l. traffic sets up a plan whereby all l.c.l. operations will be taken care of in some 20 freighthouses and transfer stations, instead of the present numerous facilities of all sorts. The saving to follow this consolidation is estimated at $2,762,581 annually.

By concentrating office forces it is estimated that a reduction of approximately 16 per cent under present forces would be obtained. The freighthouses retained follow as nearly as practicable the grouping of roads by major yards in order to simplify and expedite the necessary switching. These freighthouses are:

Chicago & North Western Chicago, Milwaukee, St. Paul & Pacific Minneapolis, St. Paul & Sault Ste. Marie	Proviso transfer, Union Street outbound, Wells Street inbound.
Chicago, Burlington & Quincy Chicago Great Western Illinois Central—South and West	Chicago, Burlington & Quincy and Alton houses
Pennsylvania Wabash	Pennsylvania houses

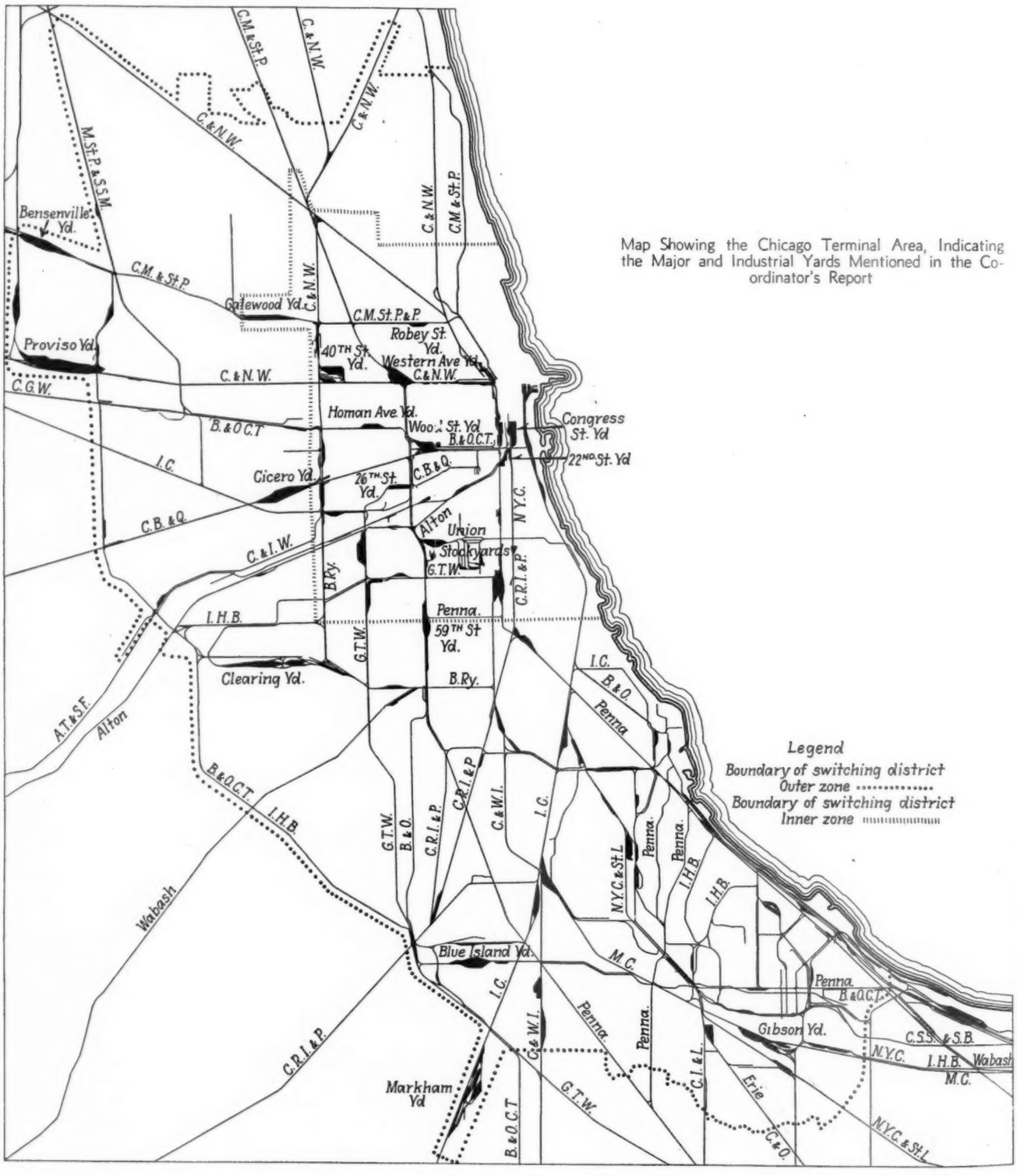
Alton Atchison, Topeka & Santa Fe Baltimore & Ohio Chicago & Eastern Illinois Chicago, Rock Island & Pacific Grand Trunk Western	Minneapolis, St. Paul & Sault Ste. Marie house, outbound, to be extended Belt Railway house at Clearing, inbound to be extended.
Chesapeake & Ohio Erie New York, Chicago & St. Louis Pere Marquette	Erie house
Michigan Central New York Central Chicago, Indianapolis & Louisville	New York Central house
Chicago Junction	Chicago Junction house No. 6 to be retained as universal station.

Because of storedoor pick-up and delivery, which is one of the major premises in this study, it is stated that many of the present outlying stations can be closed which will result in a considerable net economy.

Passenger Terminal Co-ordination

Under the passenger terminal co-ordination plan proposed, the Grand Central and the Dearborn Street stations would be eliminated and only four passenger stations would be retained, effecting an estimated saving of $613,974 per year, the railroads re-grouped being as follows:

Chicago & North Western Chicago Great Western Minneapolis, St. Paul & Sault Ste. Marie	Chicago & North Western station



Map Showing the Chicago Terminal Area, Indicating the Major and Industrial Yards Mentioned in the Co-ordinator's Report

Pennsylvania Wabash	
Atchison, Topeka & Santa Fe Alton Chicago, Burlington & Quincy Chicago, Milwaukee, St. Paul & Pacific Grand Trunk Chicago & Eastern Illinois Chicago & Western Indiana	Union station
Chicago, Rock Island & Pacific New York Central Baltimore & Ohio New York, Chicago & St. Louis Pere Marquette	La Salle Street station
Illinois Central Michigan Central Chicago, Indianapolis & Louisville Erie Cleveland, Cincinnati, Chicago & St. Louis	Central station

Estimate of Savings

The following table gives the details of the estimated savings from all sources:

Item		Estimated annual saving
Major yards		$3,484,454
Industrial yards		955,608
Industrial switching		486,062
Transfer and interchange		3,169,952
L.c.l. operations		2,762,581
Passenger		613,974
Maintenance of way and structures		255,000
Total		$11,717,631
Engine time to meet service requirements		876,000
Total		$10,851,631
Additions and Betterments:		
Major yards	$4,350,000	
L.c.l. operations	600,000	
Passenger	1,037,724	
Contingencies	1,000,000	
	$6,987,724	
Carrying charge at 5 per cent		349,386
Estimated net saving		$10,502,245

An Alternate Suggestion

An alternate suggestion offered the railroads for consideration and study is to eliminate all freight house and team track operations in the loop and South Water street areas and move them to other locations and concentration points. This alternate plan also contemplates the discontinuance of Dearborn, LaSalle and Grand Central passenger stations. It removes all freight operations north of Archer avenue and east of the Chicago river to a large l.c.l. freight traffic center projected just south of Twenty-Third street and west of the Pennsylvania main line, utilizing the present produce terminal facilities of the Chicago & Western Indiana, rearranged to serve the new plant adequately.

To avoid street congestion in the vicinity of the Twenty-Third street facility, the use of self-propelled low barges, operating on the Chicago river between Twenty-Third street and the Municipal Pier, and on the north branch of the river to the area north of Goose Island, is contemplated. These barges would handle loaded trucks or trailers and the traffic floated on the river, taking it off the highly congested streets in or near the loop. It is believed the movements would take place with greater than present rapidity and with lower cost.

A special committee, after consideration of the floating suggestion, reported that the cost of such an arrangement would, after necessary capital expenditures, etc., exceed the cost of trucking upon the streets through the loop area. If floating proves too costly, an optional arrangement could be provided, with relief to street traffic, by extending the present tunnel lines to Twenty-Third street and moving a considerable portion of the traffic underground. Vacation of the area between Van Buren to Twenty-Third streets, opening all north and south streets, would greatly facilitate trucking operations.

As previously stated, an executive committee of railway officers, consisting of T. W. Evans, H. E. Newcomet, W. W. K. Sparrow, and F. L. Thompson, delivered what might be termed a dissenting opinion to this report, wherein they set out their objections to certain of the conclusions drawn in the report as follows:

Hypotheses	Comments
Elimination of all rights of labor in the matter of reduction of forces and working conditions.	This could not be accomplished under present provisions of the Emergency Railroad Act, 1933, and the present contracts which the organizations have with the railroads.
Roads grouped in major yards and other facilities rearranged on the basis of 1934 volume of business.	Groupings proposed allow no room for expansion, yet the business for October, 1935, was substantially greater than it was in October, 1934. In our opinion, the report should have been based upon a volume of business at least 50 per cent greater than in 1934.
Elimination of property rights.	No provision is made to compensate for the use or non-use of property or for the provisions of the mortgages.
Elimination of the right a shipper now has to route his business.	Under present laws and regulations we do not understand how this could be done.
Pooling of l.c.l. shipments.	Not only are the savings of $2,762,581 apparently based upon arbitrary assumptions as to reductions in force, the soundness of which is not evident to us, but this also involves a shipper's right to route his business and extends to common points beyond the terminal, involving the consideration of many factors outside of the Chicago terminals, which in our opinion are quite beyond the scope of a terminal study.
Savings in industrial yards and industrial switching.	These savings of $1,441,660 appear to be based upon an arbitrary reduction of 20 per cent in yard forces and a further arbitrary reduction of 10 per cent in engine hours. We cannot determine the accuracy of savings arrived at in this way.

How to Execute the Plan

In connection with the execution of the co-ordination plan to bring about the estimated savings as outlined, the report makes the following suggestions:

"Co-ordination of the railway facilities and services in the Chicago terminal is possible, is economical and in the interest of both the public and the railroads. Four studies and an analysis made over a period of 30 years have produced generally the same conclusions. Other than individual expansion and improvement of some of the facilities, the situation is little different now, so far as general principles are concerned, than when the first survey was conceived. Such a co-ordinated arrangement as here proposed will encounter many obstacles and create many difficult problems. A solution can be achieved only when sought by each interest with a spirit of co-operation to produce the greatest benefits for all. Each will have to receive its due consideration. The facts set forth in this survey clearly reveal the urgency of definite action toward realization, both as to freight and passenger traffic.

"With the many different interests involved, obviously the plan cannot be made effective in one great effort. It will have to be achieved gradually through evolutional action, either between two or more lines or by zone procedure. Property holdings, usage and other

such factors have not been dealt with nor have the interests of labor been taken into account. These are matters for negotiation between the interests in the process of gravitating to complete co-ordination. Property can be committed by sale or lease; labor relations have always been a matter to be resolved by negotiation. Some changes in charges and rates will require consideration, but such arrangements can be made either by zoning the rate structure or consideration of a lowering of the switching rate scale to avoid further loss of traffic.

"One of the first steps to consider toward putting the plan into effect is to merge all switching lines, including the Elgin, Joliet & Eastern, into a common terminal. It can be done by acquirement or lease. When this primary important step has been taken, a great amount of difficulty in co-ordination of the Chicago terminal will thereby be solved and a considerable portion of the possible savings thus realized. Each line can then proceed to work out with the enlarged common terminal company the most logical joint arrangements. These appear to be along the lines specified in this report."

Task of Moving Commerce Falls Upon the Railroads

THE greatest test of railway transportation since pioneer days was faced by the railroads in the Middle West during the record-breaking blizzards which continued during last week. So severe were these snows, winds and temperatures that highway transportation was paralyzed, with the result that the welfare and lives of people in many cities and towns depended upon getting trains through. With buses, trucks and automobiles caught in snowdrifts and abandoned on the highways, many towns depending upon highways for transportation were isolated for days. Coal and food shortages became so critical that in many places families had to sleep in public buildings until fuel arrived by rail. In larger cities, coal was rationed until supplies arrived by rail. In one town of 400 persons on the Illinois Central, a car of coal arrived just as the last bit of local fuel was exhausted. The fuel situation was particularly severe in communities that had depended upon truck transportation. Little, if any, coal was stored in yards and with the demand caused by subzero temperatures prices skyrocketed.

Realizing that they were the sole dependence of many isolated communities for such vital human needs as food and fuel, the railways fought their way through despite blinding snow and subzero temperatures with a devotion to public welfare seldom equaled. Snow plows were supplemented with men who, frequently standing in three or more tiers up the sides of cuts, passed the snow from man to man in the face of biting winds that were below zero oftener than they were above. Passenger trains carried crews of shovelers. Stalled motorists were picked up at country stations even though it caused train delays. The movements of food supplies were expedited, being moved in heated cars, and coal was run through behind snow plows in special trains.

The blizzards of February were the worst experienced in the Middle West during the last 37 years and are outstanding for their persistency. Snow and wind, starting with February 4, recurred on February 8 to 10, 12 and 15 to 17, with such severity that major efforts had to be concentrated upon main lines, with the result that as much as 48 hr. passed before branch line service could be restored. The greatest difficulties were experienced by the railroads in Iowa, Illinois, Nebraska, Wisconsin, Minnesota and the Dakotas, with the result that nearly all trains were delayed and several were annulled.

On the Illinois Central, the February 4 blizzard was so bad that efforts to keep its Iowa lines open had to be abandoned when a 2½-mile cut near Macy, Iowa, filled up with snow, blocking a train. This caused the annulment and holding of trains between Sioux Falls, Iowa, Sioux City and Omaha, Neb., and Chicago and intermediate points in Iowa for 24 hr. Service on the Dodgeville, Wis., and Madison branches also was tied up on February 4. On February 8 another blizzard tied

Digging Through Snow Drifts to Rescue Passengers From Snowbound C. & N.W. Train Near Jackson, Wis.

up Sioux Falls, Sioux City and Omaha service until February 11 and still another on February 12 interfered with service again.

On the Chicago, Milwaukee, St. Paul & Pacific, the blizzards interfered with Pacific coast, Twin Cities, South Dakota, Omaha and Kansas City service, the greatest difficulty being experienced at Sturtevant, Wis., on the main line into Chicago from the north and on the Green Bay line north of Milwaukee on February 5, and 8 to 12. As a result of the situation at Sturtevant, only one track was open between Milwaukee and Chicago and it was necessary to consolidate trains over that portion of the line, causing them to be several hours late. However, the Hiawatha was never more than 3 hr. late into Chicago and on only one occasion was 6 hr. late into Minneapolis. During the period from February 8 to 10, no trains were operated over the lines between Omaha, Neb., and Marion, Iowa, and none over the Milwaukee-Rapid City, S. D., line in Iowa.

On the Chicago & North Western the February 4 blizzard interfered with train operation in South Dakota, Iowa and Wisconsin. The Milwaukee-Green Bay line via Sheboygan was impassable on February 4 and 5, and trains were operated over the line through Oshkosh. The freight line from Chicago to Milwaukee was closed for 10 days, all efforts being made to keep the passenger line open. No service was operated on the Iowa division for 24 hr. and several trains on branch lines in South Dakota were annulled. Twin Cities and Pacific Coast trains were late. On February 7, all service north

(*Continued on page 333*)

Motor Transport Section

One of the Four New Streamlined Rail-Buses in Operation on the Norfolk Southern

Norfolk Southern Regains Passengers

Highway and rail buses, convenient schedules and central terminals bring business back

WHEN the Norfolk Southern faced the loss of the greater part of its passenger business, its officers launched a definite campaign to hold what traffic was left and to regain as much of the lost traffic as possible. With these objects in mind, highway bus operations were begun as early as June, 1926, through a wholly-owned subsidiary, the Norfolk Southern Bus Corporation. Again, in December, 1934, the railway placed in operation the first of four rail-buses ordered from the American Car & Foundry Company, the mechanical details of which were described in the *Railway Age* of January 19, 1935, page 70. These two services have been co-ordinated and the results have been highly successful.

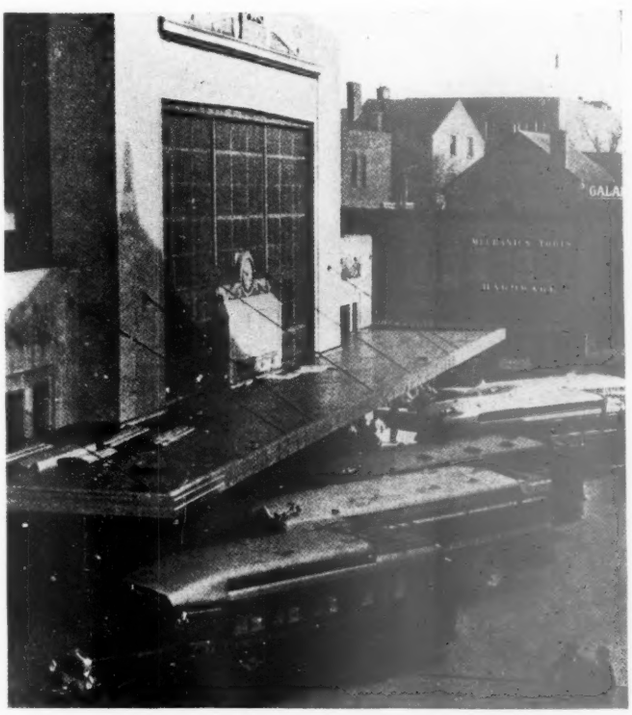
Highway Bus Operation

The Norfolk Southern Bus Corporation owns and operates 23 White, A. C. F., Mack and Yellow highway buses over the following routes:

Norfolk, Va.—Virginia Beach (loop)..	50 miles
Norfolk, Va.—Washington, N. C.....	132 miles
Williamston, N. C.—Columbia.....	50 miles
Norfolk, Va.—Mundin Point	36 miles

These consist of lines parallel to the railway, feeder lines and train replacement routes.

In January, 1935, Norfolk Southern buses began using the new Norfolk bus terminal, which is owned jointly by the Norfolk Southern Bus Corporation, the Carolina Coach Corporation and the Peninsula Transit Corporation. This terminal occupies a portion of the city produce market. It has a large waiting room with a seating capacity of 200 persons, lounge rooms and direct access to the market. Under-cover loading is provided. Its chief advantage, however, is its central location. This has been taken advantage of not only by the Norfolk Southern's highway buses, but by a



The Norfolk Union Bus Terminal Used by Norfolk Southern Highway Buses and Train Connection Service

Comfortable Seats Are Provided on the Norfolk Southern Rail-Buses

train connection service which has been worked out in connection with the rail-bus operation, which is described later.

Rail-Bus Operations

The rail-buses, which have now been in operation for approximately a year, represent a compromise between ordinary rail motor coach and highway bus construction. They are powered with a standard production engine, which is adequate in view of the light weight of the car and the fact that extremely high speeds are not attempted. The engine is a 168 hp., Hall-Scott type, similar to those in use on Norfolk Southern highway buses. The rail-buses weigh 42,685 lb. each, and have a capacity for 57 passengers and a ton of express, as compared with 29 passengers for the highway buses.

On the Norfolk-Virginia Beach run, they take the place of electric car operation, and the comparative costs of operation per mile, including interest and depreciation, the latter based on a 15-year life for this equipment, are as follows:

Electric cars displaced by rail-buses..	50 to 60 cents
Rail-buses	22 cents
Highway buses in parallel service...	18 cents

In view of the greater capacity of the rail-bus (nearly twice that of the highway buses) and the further fact that these costs include a two-man crew on rails as against single-man operation on the highways, the rail-bus costs are exceedingly interesting. These rail-buses operate between Norfolk and Virginia Beach, in electrified territory and between Washington, N. C., and Raleigh; and between Beaufort, N. C., and Goldsborough, in steam territory. They average better than 200 miles a day each.

The Driver's Compartment on the Rail-Buses Is Characterized by Clear Vision

Detailed Cost Figures

Rail-bus operation on the Norfolk-Virginia Beach route has saved the Norfolk Southern approximately $40,000 in the year since this equipment supplanted the electrical equipment previously operated. One of the savings results from the elimination of separate shops for maintaining electric and highway equipment, since the rail-buses, being largely automotive in character, are maintained in the Norfolk Southern's regular bus shops, along with the highway equipment.

The two rail-bus operations in steam territory, Beaufort-Goldsborough, and Washington-Raleigh, approximately 100 miles each, or 200 miles per daily round trip, were new schedules and not substitutes for steam train operation. In the first case, the rail-bus is inspected and serviced by a maintainer at Beaufort, and major repairs are handled in the railway's shops at New Bern, N. C. In the second case, all maintenance and inspection are performed in the railway's shops at Raleigh.

The Norfolk-Virginia Beach traffic is largely seasonal, although there is a considerable year-round population at Virginia Beach and intermediate points. During the peak months of July, August and September, 1935, the rail-buses on this run averaged 19,176 miles and 1,093,-

032 seat miles each. During this period, the detailed operating costs were:

Repairs	$ 226
Fuel	393
Lubrication	55
Crew wages	2,604
Cleaning and servicing	223
	$3,503

This averages 18.6 cents per mile for these items.

Improved Service

The consideration which induced the Norfolk Southern to use these rail-buses were as follows:

1. To attract passenger traffic back to the rails. It was proved that this could not be done on this line with the older forms of steam or electric equipment; and also that if this more attractive equipment was used, it would be desirable to effect a motor bus transfer from the outlying Park Avenue station to the central business area so as to place the new service on a basis comparable with highway service as to cost and convenience.

2. To reduce costs. With diminished passenger revenues, units offering lower costs of operation were required if schedules necessary to attract the public were to be effective. The rail-bus was the logical answer to the inroads made by highway buses on this line and in this character of service.

3. To provide faster service. Since passengers were abandoning the railroad and favoring the highway bus, it was assumed that if a rail-bus could provide faster service than could be given by the highway bus and could carry twice the number of passengers as the largest bus permissible on the highways, it would justify operation by rail, particularly since the rail line had to be maintained for freight service.

4. To provide more frequent service. Since the frequency of operation must be at least equal to that of the highway bus, single car units appeared desirable, such units being fitted with governors so that a maximum speed of 55 miles per hour could not be exceeded.

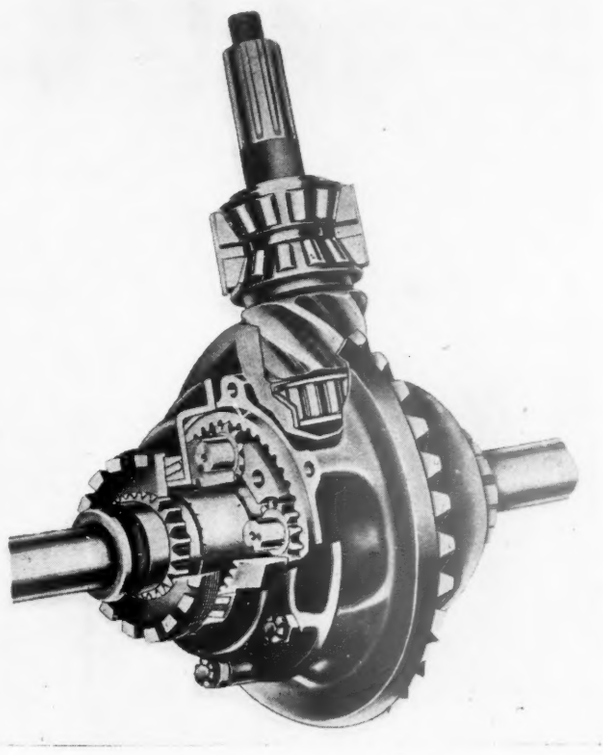
5. To offer safety and comfort. The streamlined rail-bus could afford a safer and more comfortable ride with running time (transfer included) equal to that of the highway unit and still satisfy the bus-minded passenger. It would be capable of producing transportation economically at a lower cost per seat mile than the highway bus and at only nominally greater cost per vehicle mile. When doubling on the highway trips is taken into consideration, the cost per scheduled trip mile is quite comparable.

The railroad owns the bus lines paralleling the Norfolk-Virginia Beach division and with the rail-buses and highway transfer in operation, it is possible to provide a 100 per cent co-ordinated service between both agencies from the uptown Union Bus Terminal; the rates are the same, tickets are good on either form of transportation and schedules are so staggered that, as the service develops, more business will accrue to the rail-buses, with less traffic and congestion on the highways. The change to the mid-town bus terminal overcame one of the handicaps of the rail service for, when running out of the railroad union station, a street car ride and additional time were required to make the connection. Under the new set-up, the charges for railroad bus transfer and uptown facilities will not exceed the cost of the old terminal service at the union railroad station while the service is vastly improved.

New Internationals

THE International Harvester Company has announced the addition of three new models to its line of motor trucks, each of which features two-speed axle construction providing for eight forward and two reverse speeds.

With this construction all the advantages offered by both the high-speed and low-speed axle ratios are combined in one unit. In the past it has been necessary for truck owners requiring variable performance ability to choose between a high or low-speed axle ratio. The high-speed axle ratio allows the truck to be driven on level roads at high speeds with consequent saving in engine wear and gasoline and oil consumption, due to slower engine speeds. The objection to the high-speed axle ratio was that payload must be sacrificed if hills and rough roads were to be negotiated. If operating conditions necessitated using a low-speed axle ratio, engine wear and gas and oil consumption were increased due to higher engine speeds. Road speeds with the low-speed axle ratio naturally were sacrificed for the necessary power.



Cutaway View of the International Two-Speed Rear Axle. This Shows the Four Planetary Gears in the Unlocked or Low-Speed Position. The Truck Can Now Operate Through Any Transmission Gear As a Powerful Low-Speed Unit.

With the International two-speed rear axle models, however, the truck owner has both speed and power, combined and available in one unit. The low-gear axle ratio enables heavy loads to be hauled up steep hills and over rough roads, while the high-gear axle ratio allows high speeds on level roads or with light loads. A simple movement of the shifting lever and the driver changes to either low-speed or high-speed operation instantly and silently without stopping the truck. This two-speed rear axle is available in both the 5.14 to 1-7.15 to 1 and the 6.16 to 1-8.57 to 1 axle ratios.

The Bus Equipment Used by the Northern Pacific Is Modern and Streamlined

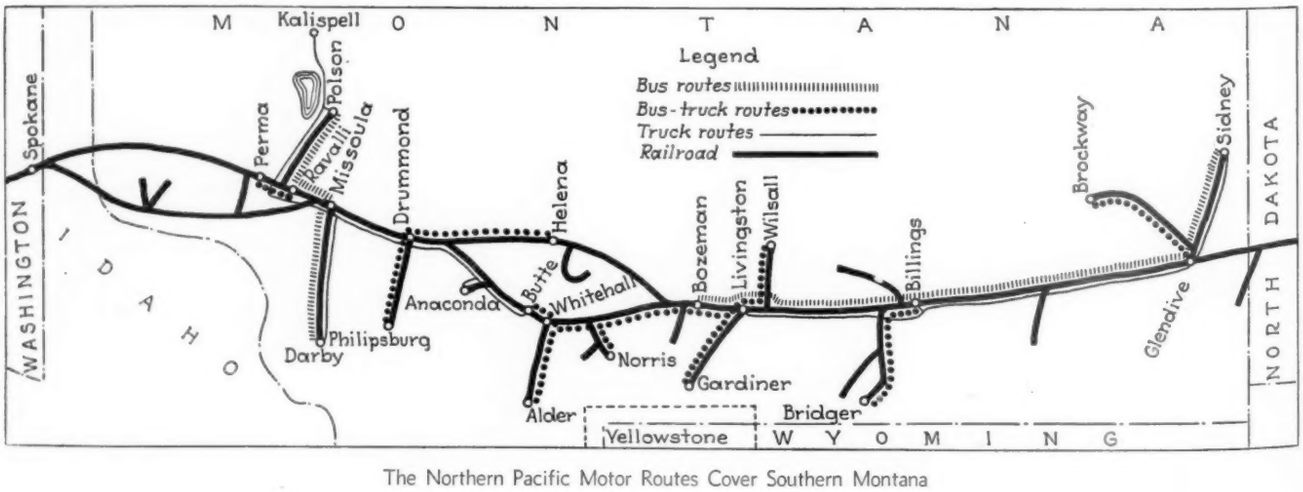
Improved Service Featured in Rail-Highway Co-ordination

Northern Pacific finds an answer to branch line problems in Montana during the past year

THE Northern Pacific Transport Company, a wholly-owned highway subsidiary of the Northern Pacific, began a bus-truck operation between Billings, Mont., and Miles City, in January, 1932. There was some slight expansion of co-ordinated highway service in three following years, but it was not until March 1, 1935, that the major portion of the operation was begun. Since that time the operations have been carried forward with such vigor that the Northern Pacific Transport Company now operates 5 bus, 9 bus-truck and 8 truck routes, with a monthly schedule of 39,055 bus miles, 33,175 bus-truck miles and 55-676 truck miles, or a monthly schedule for all types of highway equipment of 127,906 miles.

From Yates, Mont., on the North Dakota border, to Rathdrum, Mont., on the Idaho border, the distance across Montana via the route of the North Coast Limited, is 847 miles; the Northern Pacific has, in addition, some secondary main lines and a large branch line mileage within the state.

On these branch lines, the service was formerly performed by mixed trains operating from two to six days a week. Under the present arrangement, all the branch lines are given passenger, mail, express and l.c.l. freight service daily, except Sunday, by highway. Not only has this service expedited this class of traffic, but it has also benefited shippers of live stock as well. Under the present set-up, freight trains are run on the branches to take care of carload business only. This permits stock pick-up trains to be run on branch lines so as to make



The Northern Pacific Motor Routes Cover Southern Montana

close connections at junction points with main line stock trains, resulting in expedited service to the markets, and, in many cases, requiring one less feeding of the stock enroute. Such schedules were not possible when the branch line trains had to make frequent stops to protect their mixed train schedules.

Likewise, on the main line, way freight trains were operated bi-weekly or tri-weekly in some territories to handle the merchandise. This traffic is now handled daily, except Sunday. By close co-ordination between rail and truck schedules, merchandise is now handled over the long distances by expedited train service while the trucks are used between the terminals for local distribution. For example, cars moving on overnight trains from Billings and Bozeman to Butte connect with a bus-truck leaving Butte in the morning for the Alder and Norris branches. The co-ordinated service is made still more flexible by the operation of set-out cars on overnight freight trains between many points. The trucks also provide storedoor pick-up and delivery service in the larger cities, and, in many of the smaller towns, collection and delivery service is contracted for with local drayage concerns.

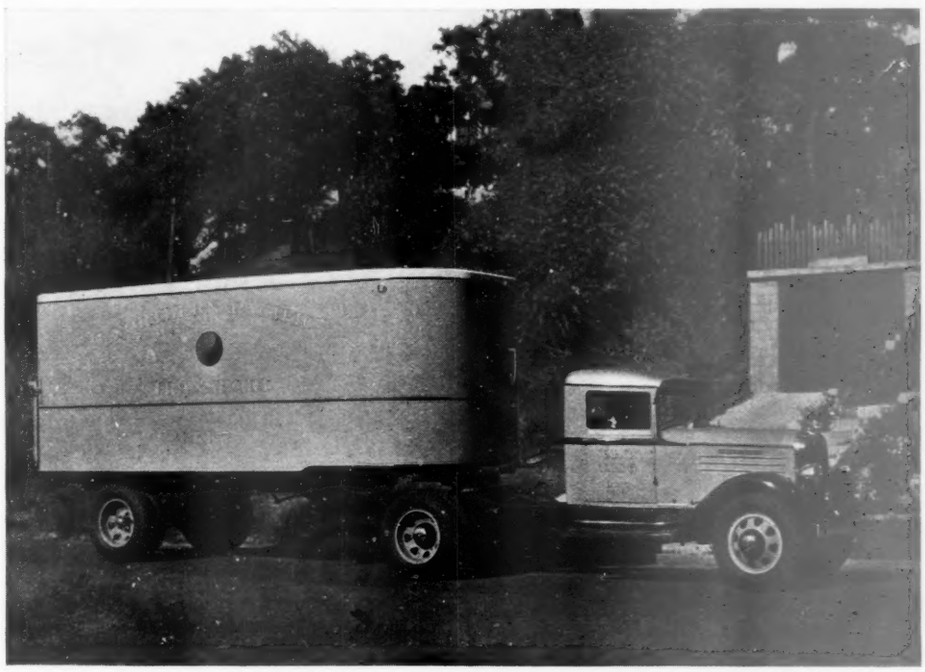
The growth of this service has resulted in the provision of overnight service from all jobbing points on the Northern Pacific in Montana to practically all consuming points on that railroad. It has also speeded up materially the schedules to local points in Montana on l.c.l. traffic from the Pacific Coast and from Chicago. The increased flexibility and better schedules resulting from the rail-highway co-ordination have also attracted considerable traffic back to the rails.

The buses and the bus-trucks are used both for local service and as feeders in long-haul passenger business for main line trains. The co-ordination of trains and buses results in better connections for branch lines, as well as more frequent service than would be justified if it were necessary to operate steam trains.

Tickets of the transport company are interchangeable with rail tickets. As a matter of fact, the service is interchangeable as well, for, during the severe winters when the roads are occasionally blocked with snow, passenger train service is substituted for a trip or two. Conversely, on two occasions last summer when the railway was blocked by washouts, the buses were invaluable in getting passengers through with a minimum of delay.

The following routes, also indicated on the accompanying map, are now being operated:

Bus routes	(Mileages shown are one way)	Miles
Billings-Glendive	Daily	233
Glendive-Sidney	Two trips daily	55
Billings-Bozeman	Daily	148
Missoula-Darby	Daily	68
Missoula-Polson	Daily except Sunday	72
Bus-truck routes		
Billings-Bridger	Daily except Sunday	48
Glendive-Brockway	Daily except Sunday	63
Bozeman-Livingston-Gardiner	Daily except Sunday	86
Livingston-Wilsal	Daily except Sunday	33
Bozeman-Whitehall-Alder	Daily except Sunday	121
Butte-Whitehall-Norris	Daily except Sunday	68
Helena-Drummond	Daily except Sunday	73
Drummond-Philipsburg	Daily except Sunday—two trips	29
Charlo-Perma-Ravalli	Daily except Sunday—two trips	29
Truck routes		
Glendive-Sidney	Daily except Sunday	55
Billings-Glendive	Daily except Sunday	239
Billings-Livingston	Daily except Sunday	120
Butte-Anaconda-Missoula	Daily except Sunday	145
Missoula-Hamilton	Daily except Sunday—two trips	50
Hamilton-Darby	Daily except Sunday	18
Missoula-Polson	Daily except Sunday—three trips	72
Polson-Kalispell	Daily except Sunday	55



Truck Lines Supplement Northern Pacific Through Freight Trains in Montana

The equipment owned by the Northern Pacific Transport Company is as follows:

Buses

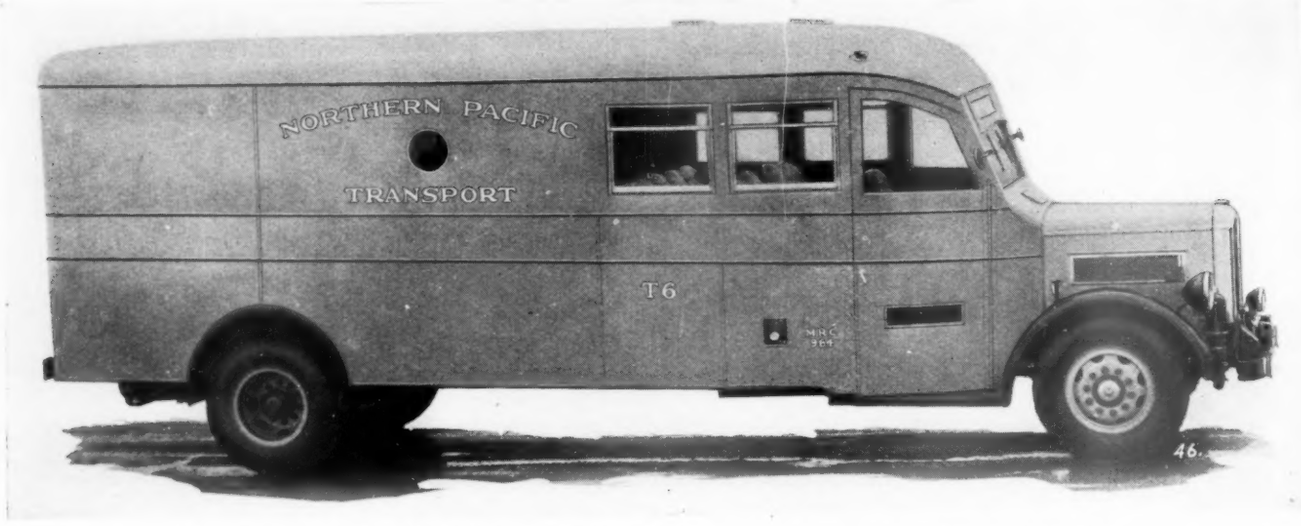
1—12 passenger
7—17 passenger
1—29 passenger

Bus-trucks

6—9 passenger, 4-ton freight
1—5 passenger, 2½-ton freight
2—5 passenger, 1½-ton freight

Trucks

6—heavy-duty tractor trucks with five 10-ton semi-trailers
1—light-duty tractor truck with one 7-ton semi-trailer



This Type of Bus-Truck Is Used by the Northern Pacific Transport Company for a Variety of Purposes

3—3½-ton trucks with van bodies
1—3-ton truck with open box body
1—2-ton truck with van body
2—1½-ton trucks with van body
4—1½-ton trucks with stake body
1—half-ton truck with pick-up body
1—four wheel, 5-ton trailer
Company cars
2—1935 four door sedans

The light trucks are used for overflow business, for pick-up and delivery at Missoula, where the transport company performs this service with its own organization, and for operations in the spring when highway restrictions on certain routes limit the gross weight of a vehicle to 14,000 lb.

Equipment Maintenance

Because of the state-wide operation and the diversity of types of equipment required for local service, it is not possible to concentrate the maintenance of the buses and trucks at a central point as might be done if a number of the routes radiated from one central point. This latter idea has been followed insofar as operations permit, and the transport company maintains garages at Billings and Missoula, where all the equipment operating out of those points is serviced.

Also, when operations permit, the equipment at isolated points is interchanged so that the servicing can be performed at a central point. For example, the Glendive-Sidney bus is pooled with the Billings-Glendive bus, so that three identical units are operated as follows: First day, Billings to Glendive; second day, Glendive to Sidney and return (two trips); third day, Glendive to Billings. All three units are thus maintained and serviced by the shop force at Billings.

In similar manner, three bus-trucks on the Bozeman-Livingston-Gardiner, the Bozeman-Whitehall-Alder and the Butte-Whitehall-Norris routes are pooled and change off at Bozeman and Whitehall as follows: First day, Livingston-Bozeman-Alder-Whitehall-Butte; second day, Butte-Norris-Whitehall-Bozeman; third day, Bozeman-Livingston-Gardiner-Livingston. All three units, as well as a small bus-truck on the Livingston-Wilsall route, are maintained at Livingston by a transport company mechanic and helper. Garage space at Livingston is rented in a commercial garage but all the work is done by transport company shopmen. Storage only is required at Bozeman and Butte.

At Glendive, Helena, Whitehall and Charlo there are other units which cannot be worked into the above set-up. These are housed and maintained by local commercial garages and, in addition, a transport company traveling mechanic checks them once a week.

The transport company has also worked out a systematic maintenance program which includes a preventive maintenance check-up each thousand miles. This is handled by transport company mechanics at Billings, Livingston and Missoula, and by the traveling mechanic at isolated points. An extensive stock of repair parts is carried at Billings to protect all equipment. Body repairing and painting is done at the Billings shop, while extensive overhaul work is taken care of at both Missoula and Billings. Gasoline is purchased in tank wagon lots on a quantity basis and transport company tanks and pumps are located at five strategic points so as to take care of practically all fuel requirements. Where no garage is maintained, the gas pump is located at the freight house.

* * *

Stock Model 1½ Ton Chevrolet Truck, Which Recently Climbed Pike's Peak at 29.8 m.p.h. Empty and at 20.5 m.p.h. with a 3,000-lb. Load in a Spectacular Performance Test

Commission Deluged with Motor Carrier Applications

With February 12 deadline past, I.C.C. is now preparing for another flood about March 2—the tariff-filing date

WASHINGTON, D. C.

AFTER having been deluged during the days immediately preceding and following February 12 with thousands of belated applications for certificates and permits filed by bus and truck operators entitled to them under the "grandfather" clause of the motor carrier act if they were in bona fide operation prior to June 1 and July 1, 1935, the Interstate Commerce Commission's Bureau of Motor Carriers is now preparing for a similar and even greater flood about March 2 of motor carrier tariffs to become effective on April 1 which will give the first picture of motor carrier rates under a system of regulation.

For a time the rate system under published tariffs is not expected to differ much from the chaotic conditions which have prevailed in the absence of interstate regulation, when motor carriers charged what rates they considered necessary to get the business, although many of them may be somewhat higher because so many of the operators, knowing little about rates, seem to be following with some changes the basis of rates heretofore used by the railroads, that have spent millions of dollars to publish tariffs. The truck rates in many cases will be based on a new classification formulated by a committee of the American Trucking Associations, Inc., and many of them are joining in joint conferences representing groups of operators, but when it comes to the actual naming of rates few of them have much to go by except the railroad tariffs.

The process of development is still going on, however, in numerous conferences held in various parts of the country, and already organizations representing truckers have started an agitation for a further postponement of the date for making tariffs effective. The National Conference of Truck Tariff Bureaus has filed a petition with the commission asking a further postponement for one month, saying it will be utterly impossible to have the tariffs ready by the date set.

Last-Minute Flood of Applications

The "deadline" for the filing of applications under the "grandfather" clause was February 12, after three postponements by the commission, and in the day or two just before the last one allowed by the law the commission received some 25,000 pieces of mail, many of them containing bunches of applications which had been prepared by lawyers or local associations representing groups of operators. For a couple of days more the flood of applications continued and the bureau also received notices of others that had been deposited in the mails but had not been delivered because of delays to the mails caused by severe weather conditions in the middle West.

It was roughly estimated that the total of applications received was somewhere between 50,000 and 100,000 but no effort was made to count the number in advance of their handling to ascertain whether the applications were in proper form. The bureau had mailed notices and follow-up letters calling attention to the fact that February 12 was the last day for receiving "grandfather" clause applications to a list of some 200,000 truck and bus operators but it never had any very good estimate of the number of interstate operators subject to the law and not covered by some of the numerous exemptions. It is believed that some thousands of operators in service before the enactment of the law who should have filed applications have failed to do so and are now operating illegally but no one knows how many there are and the commission has not yet completed the organization of its field forces which will be charged with the duty of finding out. Already there has been some talk of a request being made on behalf of the operators for an amendment to the law to authorize belated applications but it is understood that the commission's first concern will be to locate operators who have begun service since the effective date of the motor carrier act but who have not yet applied for certificates or permits.

Warning on Tariff Deadline

The commission on February 13 issued a notice to motor carriers warning all who had filed applications under the "grandfather" clause to file tariffs or schedules on or before March 2 to avoid danger of penalties, stating that some carriers had filed applications as a precaution but believe that eventually they will be found to be not subject to the motor carrier act. Others do not know whether they will eventually be found to be common carriers or contract carriers, and hence are in doubt, until this is determined, whether they should publish tariffs as common carriers or file schedules as contract carriers.

If the commission later finds that they are not subject to the act, its notice said, the tariffs or schedules may then be withdrawn. Where a carrier is in doubt as to whether it is a common carrier or a contract carrier, or both, it should, until this matter is determined by the commission, file tariffs or schedules, or both, according to its best judgment of the status of its operations under the act. If the commission later reaches a different conclusion in regard to such status, opportunity will be given to change what has been filed so that it will conform with the commission's finding. In the meantime the tariffs or schedules will be regarded as valid, unless defective in other respects.

In the case of motor carriers who perform local pick-up and delivery service for rail or water carriers or inter-city motor carriers, it will be sufficient, until their status under the act has been definitely determined by the commission, to file schedules of their minimum charges for such service. They are not precluded, however, from filing tariffs, if they choose to do so. Until the commission has determined the status of such local pick-up and delivery carriers, line-haul carriers may publish tariffs or schedules providing for pick-up and delivery service without showing therein the participation of

the local pick-up and delivering carriers, if the latter have filed tariffs or schedules, or both.

First Hearing Set for February 24

The first hearing under the motor carrier act has been announced for February 24 at Washington, before Director John L. Rogers of the Bureau of Motor Carriers, on the application of Pan American Bus Lines, Charlotte, N. C., for a certificate to operate as a common carrier of passengers between New York, Washington, and Miami, via U. S. Highway No. 1.

The commission on February 11 announced the creation under the act of the first of the joint boards of representatives of state authorities which are to have an important part in its administration, followed shortly by the announcement of additional joint boards and the assignment to them of hearings on applications filed by carriers desiring to engage in new or extended services. Joint Board No. 1 consists of Andrew Olson, of the Illinois Commission; Samuel L. Trabue, of the Indiana commission, and Cliff Claypool, of Kentucky. The board was created "to hear, consider, and recommend an appropriate order upon any and all matters referred to it by the commission involving operations of motor carriers or brokers conducted or proposed to be conducted in the said states of Illinois, Indiana, and Kentucky, and it is hereby vested with all of the rights, duties, powers, and jurisdiction conferred and authorized to be conferred upon such joint boards by said motor carrier act, 1935."

Joint Board No. 2 consists of Stanley Winborne, of the North Carolina commission, and Sam C. Blease, of the South Carolina commission.

The first hearings to be held by the joint boards were also announced. Joint Board No. 1 is to hold a hearing at Indianapolis, Ind., on March 2 on the application of the Willet Company of Indiana, Inc., of Chicago, for a permit to operate as a contract motor carrier of commodities generally in station to station service for the Pennsylvania in Illinois and Indiana. Joint Board No. 2 is to hold a hearing on the application of the Southeastern Express Company for a certificate to operate as a common carrier of property from Charlotte, N. C., to Columbia, S. C. Joint Board No. 3 is to hold a hearing on March 2 at New York on the application of Scott Brothers, of Philadelphia, for a permit to operate as a contract carrier in collection and delivery service for the Pennsylvania in the metropolitan area of New York and Jersey City. Board No. 4 is to hold a hearing on the application of the Dixie Greyhound Lines for a certificate to operate as a common carrier of passengers between Memphis, Tenn., and Jackson, Miss.

The commission, by Division 5, on February 17 made public orders for a series of investigations and hearings to determine the extent and area of the municipalities of St. Louis, East St. Louis, New York, Chicago, and Los Angeles, and the municipalities contiguous thereto and the zone or zones adjacent to and commercially a part of such municipalities, saying that it is necessary for the proper administration of the act and that a determination shall be made within the meaning of Section 203 (b) of the act. That section provides an exemption of transportation in interstate or foreign commerce wholly within a municipality or between contiguous municipalities or within a zone adjacent to and commercially a part of any such municipality or municipalities, except when such transportation is part of a through movement.

In the St. Louis case action was taken on petition of the Columbia Terminals Company and the investigation includes the question of what classifications of groups of motor carriers, if any, may be necessary and proper for the administration of the act within the areas determined and defined. The hearings, before examiners, will be held on March 9 in each of the cities.

The commission has issued a series of modifications and additions to its rules for the preparation and filing of tariffs to make them fit in with the new rules and regulations applicable to motor carriers, particularly in the case of tariffs containing joint rates between railroads and motor carriers.

Tariffs applicable to the transportation of express filed under section 6 of Part I of the act are to be published and filed in accordance with regulations heretofore adopted and promulgated in Tariff Circular No. 19-A and in supplement No. 1 thereto, as modified and supplemented by section 1 of supplement No. 3 to Tariff Circular No. 19-A.

Tariffs of express companies subject to Part I of the act and common carriers of property by motor vehicle containing the joint rates referred to and tariffs of the express companies containing rates for the transportation of property by motor vehicle owned or leased by such express companies or partly by rail or water and partly by such motor vehicle, are to be published, filed, posted and kept open for public inspection in the form and manner prescribed in section 2 of supplement No. 3 to Tariff Circular No. 19-A.

The policy committee of the American Trucking Associations, Inc., at a special meeting in Washington on February 7, decided to ask the Interstate Commerce Commission to order a thorough investigation of all phases of the pick-up and delivery service established by the railroads, including the question of the legality of the allowance to shippers who perform the pick-up and delivery service for themselves, whether the service is compensatory, and whether motor carriers performing service for the railroads are subject to the motor carrier act.

New Set-up of Reading-Jersey Central Transportation Companies

THE board of public utility commissioners of New Jersey has approved a new set-up for the Reading Transportation Company and the Jersey Central Transportation Company, involving a stock transfer between the various companies and the parent railways.

The new arrangement is intended to unify and consolidate the Jersey Central Transportation Company and the Reading Transportation Company motor bus activities under a single control, through the medium of ownership by the Reading Transportation Company of the entire 200 shares of capital stock of the Jersey Central Transportation Company. The consideration to be paid by the Reading Transportation Company to the Central of New Jersey for this stock is $48,063. At the same time, the Central of New Jersey proposes to purchase 1,800 shares of the capital stock of the Reading Transportation Company from the Reading for the same consideration, namely, $48,063. These 1,800 shares represent a 15 per cent interest in the Reading Transportation Company, the remaining 85 per cent being held, as heretofore, by the Reading.

The present service and schedules maintained by the two bus transportation companies will be continued under the unified operation, so that the service will not be affected.

Latest Addition to the East Broad Top's Bus Fleet—Reo with Fitzjohn Body

Interline Business Makes East Broad Top Buses Profitable

Short-line railroad's subsidiary has become an important link in through Buffalo, N. Y.,-Washington, D. C., service—Also operates truck route

BY entering wholeheartedly into the bus business for its own sake, the East Broad Top Transit Company, highway subsidiary of the East Broad Top Railroad & Coal Company, has made its 125-mi. motor coach line a vital link in an important through highway passenger service between the Buffalo, N. Y., metropolitan area and Washington, D. C., and Baltimore, Md. Finding local traffic insufficient for profitable operation—and not content to remain only a train-replacement agency of its parent railroad, with "profits" measured in "savings in railroad operating expenses"—the transit company has actively co-operated with connecting bus lines in the development and promotion of the Buffalo-Washington "Pioneer Trail Route." It also operates one motor truck route, providing highway freight service for its own account and doing other hauling under contract with the railroad.

The East Broad Top is a short-line railroad located in the south-central part of Pennsylvania. Coal is the principal commodity which it carries and its main line extends from a connection with the Pennsylvania at Mount Union, Pa., generally in a southerly direction to Orbisonia and thence southwest to Alvan. In addition to this 33-mile main line there are branches and sidings which bring the total track mileage operated to 75. The passenger business on the railroad is now handled by four daily motor trains and two mixed trains which accommodate miners.

Drastic declines of this rail passenger traffic prompted the East Broad Top to organize its highway subsidiary and enter the bus business in 1929. Its original bus line extended from Huntingdon, Pa., to McConnellsburg, 53.9 mi. This local route paralleled the railroad's main line from Mount Union to Orbisonia and brought substantial savings by permitting the elimination of unprofitable train service; it was not profitable in itself.

General Motors Truck Operated in East Broad Top Highway Freight Service

The conclusion was therefore reached that the bus line, if it would become a net revenue producer, must participate in interline traffic; and, if it would become an important participant in such through business, it must reach out to larger communities where satisfactory interchange arrangements might be made. Hence the successive extensions to the north and south until the present 125-mi. route from Altoona, Pa., via Tyrone, to Hagerstown, Md., was rounded out.

Interline Business Brings 60 Per Cent of Gross

The 109-mi. section between Tyrone and Hagerstown is the East Broad Top Transit Company's segment of the "Pioneer Trail Route"; the 73 mi. between Hagerstown and Washington is covered by the Blue Ridge Lines, which also serve Baltimore; and the 228 mi. from Tyrone to Buffalo by the Fullington Bus Company (36

Highway Routes of East Broad Top Transit Company and Its Principal Connections

mi.) and the Edwards Motor Stages (192 mi.). This 410-mi. Buffalo-Washington route is the shortest available between those two points—shorter by 125 mi. and by from 3 to 6 hrs. than any other. With its successful promotion, the through traffic has become the mainstay of the East Broad Top's bus business, accounting for 60 per cent of its bus revenues and bringing the added volume which has turned deficits into profits. Gross bus revenues for 1935 were $33,000, of which about $20,000 came from through business. Last year's net after all charges was approximately $6,500, as compared with about $6,300 in 1934.

None of the connecting bus lines has any investment in the East Broad Top Transit Company, nor is the latter interested financially in them. All interline agreements are based on definite through rates and division arrangements, and, realizing the importance of promoting and keeping these arrangements satisfactory and harmonious, the E.B.T. traffic department maintains continual contact with agents of connecting and originating bus carriers, thus keeping the latter "Pioneer Trail Route" conscious. The usual 10 per cent commission is paid to ticket agents. Revenue from interline tickets averages about 2.5 cents per mile, while the rate for local service is 3 cents per mile, with a 10 per cent reduction for round trips and multiple-trip student and workmen's tickets available respectively at 40 and 50 per cent of the regular fares. No attempt is made to co-ordinate the local service in detail with either the railroad service or its facilities; at only one point—Mount Union—is the railroad station used also as the bus station.

In addition to its principal connections at Tyrone and Hagerstown, the transit company has interchange arrangements at several other points, such, for example, as Altoona, McConnellsburg and Greencastle, Pa., where it connects with various routes of the Pennsylvania Greyhound Lines, and Hagerstown, from which point a line of the Blue Ridge extends to Winchester, Va. It also does a substantial special-party charter business and has certificates, now in suspense, for the operation of buses between Huntingdon and State College, Pa., between Mercersburg and Chambersburg, and between Orbisonia and Saltillo. These three local branch routes proved unprofitable and the company has obtained permission to suspend service on them until such time as potential traffic may warrant a resumption.

Equipment Kept in First-Class Condition

The East Broad Top Transit Company owns seven buses and one truck—four of the buses and the truck are General Motors vehicles, one bus is an A.C.F., another a White, and another a Reo, with a Fitzjohn body. The latter, which has just recently been delivered, is of semi-streamlined design. All the buses are of 21-passenger capacity except the A.C.F., which seats 25. This equipment is maintained in first-class fashion, and in comfort and appearance is on a par with that of the country's larger long-distance bus operators. The East Broad Top realizes in this connection that it must maintain such standards for its equipment if it is to retain the patronage and good will of through passengers, who must not be "let down" as they transfer from buses of one company to those of connecting lines.

Normally, four buses are sufficient to protect the regularly scheduled runs—three actually in operation and one undergoing inspection and reservicing. Thus the other three are available for emergencies and special charter work that is much in demand from colleges and schools on this route. Also, if unusual conditions bring a demand for additional buses, arrangements for obtaining them have been made with connecting lines, from which equipment can be hired on short notice. Regular schedules call for three daily round trips over the entire route from Altoona to Hagerstown. Southbound buses leave Altoona at 9:30 a.m., 2:35 p.m. and 8:20 p.m., connecting at Tyrone with connecting-line buses which are scheduled to leave Buffalo respectively at 9:10 p.m. the previous night, 7:00 a.m. and 11:45 a.m.; the first of these latter has through connections from Toronto, Ont., and the second from Hamilton, Ont. These arrive at Hagerstown at 1:25 p.m., 6:45 p.m. and 12:30 a.m., and their Southern connections reach Washington at 4:00 p.m., 11:40 p.m., and 3:30 a.m. Northbound buses, with connections from Washington and other southern points, leave Hagerstown at 5:55 a.m., 10:35 a.m., and 4:05 p.m., and arrive in Altoona respectively at 9:30 a.m., 2:35 p.m. and 8:10 p.m. In addition to these through runs two round-trip local runs are made daily, except Sun-

days, between Huntingdon and Orbisonia. The company's drivers are men who have been developed especially for that job and are outfitted in attractive uniforms like those worn by employees of large systems.

All buses, except two which lay over at Hagerstown, are garaged nightly at Rockhill Furnace, just outside Orbisonia, where the East Broad Top offices and railroad repair shops are located. Motor vehicle repair facilities have been added to these latter and repairs to the highway equipment are made by railroad forces under contract with the subsidiary. To the excellence of these repair facilities, and the policy of keeping equipment in first class condition by continuous attention to running repairs, is given much of the credit for the low operating cost per bus mile. For 1935 this figure was 12.5 cents, including depreciation; for the month of November, 1935, it was 10.31 cents. The daily mileage is, of course, also an important factor, since the through buses make as much as 257 mi. per day.

The Truck Route

The East Broad Top's truck is operated on a route between Huntingdon and McConnellsburg. With it the transit company provides door-to-door freight service for its own account and also does pick-up and delivery work and handles company material for the railroad under contract. When an unusual volume of freight or other work develops, additional trucks are hired from local operators.

Officers of the parent railroad are also officers of the transit company. C. D. Jones, vice-president and general manager of the former, is president of the latter and P. F. Yeager is traffic manager of both; N. P. Bernhardt, chief engineer, J. O. Bowmaster, master mechanic, also serve both companies. These executives maintain their headquarters at Rockhill Furnace.

Interesting California Decision

THE California Railroad Commission was called upon recently to decide between two applications for truck lines between Sacramento and Nevada City. One was from the United Motor Transport Lines, an independent truck operator, already running a freight line part way, between Sacramento and Auburn; the other was that of the Nevada Pacific Trucking Agency, a joint subsidiary of the Nevada County Narrow Gage Railroad and the Pacific Motor Trucking Company which, in turn, is a subsidiary of the Southern Pacific. The territory between Auburn and Nevada City has not hitherto had truck service.

The independent operator maintained that, since it was already providing service part way, it should be permitted to extend this service, while the railways' subsidiary maintained that ,since the railways had been providing transportation in the territory for years, they should be granted an exclusive certificate.

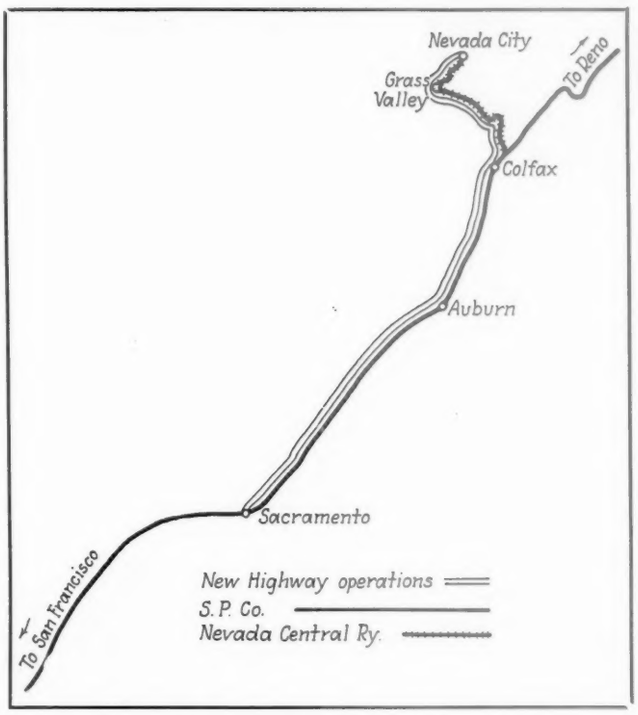
Faced with a difficult decision, the commission took a middle course. In its opinion, a certificate of public convenience and necessity to operate a trucking service between Sacramento and Grass Valley and Nevada City, but not including the Sacramento-Auburn area, was granted the Nevada Pacific Trucking Agency. In an accompanying opinion an application of the United Motor Transport Lines, to extend its present Sacramento-Auburn service to Grass Valley and Nevada City and intermediate territory, was denied.

The question at issue in the applications before the commission was summarized as follows in the opinion:

"First, which of the two applications, Nevada Pacific Trucking Agency or United Motor Transport Lines, Inc., should have the certificate to perform said service?

"Secondly, consistent with public interest, to what extent should such certificate be limited?

"The record impels two outstanding conclusions. First, the Nevada County Narrow Gage Railroad is rendering a vital and necessary service to the communities of Grass Valley and Nevada City. The perpetuation of this railroad is a matter of public interest. Secondly, United Motor Transport Lines is performing a necessary and adequate service between and including Sacramento and Auburn. Said trucking company operates through joint rates with the river lines and affords an expedited movement of freight between San Francisco and Oakland on the one hand, and Sacramento and Auburn on the other. Similarly, the preservation of this service is a matter of



The New California Truck Route

public interest. There is room and need for both carriers.

"Sound regulation supports and directs a true course for public interest. This course must afford the greatest advantages and the best results for those served. Those who are served suffer when the one serving is crippled. Hence, sound regulation gravitates along a course compatible to the welfare of the utility that is rendering a vital service, a necessary service, an adequate service.

"If this commission were to grant the certificate sought by United Motors Transport Lines, the Nevada Narrow Gage Railroad would be in grave peril. Such a predicament should be avoided if possible.

"If this commission were to permit the Nevada Pacific Trucking Agency to parallel or substantially duplicate the service of United Motor Transport Lines, the latter carrier would similarly be in grave peril. Correspondingly, this predicament should be avoided if possible.

"It therefore, follows that a co-ordinated rail and truck service should be permitted the Nevada Pacific

Trucking Agency for the transportation of freight and express, consisting of a direct daily auto truck service between Sacramento on the one hand, and points northerly from Auburn and including Grass Valley and Nevada City on the other hand, and between Auburn on the one hand and Nevada City on the other hand, both places being included; provided that such service shall not be extended to, and shall not affect, directly or indirectly, points between Sacramento and Auburn. It appears that the inauguration of such a service will at once make possible definite economies in the operation of the Nevada County Narrow Gage Railroad, and will afford the territory between Auburn and Nevada City inclusively an overnight freight service which is needed, and which would appear to be adequate."

Express Agency Begins Five-Year Safety Plan

THE Railway Express Agency has called upon all operators of express trucks throughout the country to participate actively in national and local campaigns to combat the growing seriousness of the motor vehicle accident problem. L. O. Head, president, has inaugurated a five-year safe-driving plan for the express service, in which over 50,000 employees of the company in some 20,000 cities and towns have been enlisted.

"Because of the expedited character of express service," said Mr. Head "it becomes necessary for the men placed in charge of our 9,500 trucks to drive in the heavy traffic districts of every city at the peak of the congestion. In delivering and calling for shipments and in movement to and from express terminals, our operators face the most difficult of driving conditions. They have a splendid record for careful driving. Accidents in which our vehicles are involved are relatively few. Our 800 chauffeurs in Chicago, for instance, recently won the Safety Council award for the 12 months ending June 30, last. But the hazard of motor vehicle mishaps is always present. Our plan is to keep this subject constantly before our men and to honor the drivers who continually keep their record clear of responsible accidents."

The express company is one of the largest motor fleet operators in the United States, using one or more trucks in over 5,000 cities and towns, with substantial equipment in all large centers of population. In New York City, for example, approximately 1,000 units, gas and electric-powered, are used by the Express Agency in covering a large part of the 300 square miles of corporate area. In Chicago, 600 trucks are required for express deliveries and pick-ups, in addition to a fleet of tractors and trailers especially designed for the exceptionally large transfer movement between terminals in that city.

The safe-driving plan in the express service will be carried forward by safety committees to promote accident prevention, formed by local express employees, with the local agent or general agent as chairman and various branches of the service having representatives. These committees will meet regularly and make a study of all mishaps reported. The purpose is to enable any employee involved to explain what happened and what he did and to discuss with the others just how the accident could have been avoided. At the same time, the officers in charge conduct their usual investigation to determine responsibility and to take steps to prevent a repetition. An analysis is now being made of the driving records of all truck operators employed by the Express Agency in 1935, to select those who went through the year without a "responsible" vehicle accident of any kind, as a basis of the first award under the new plan. Merit cards, signed personally by the superintendent of the division in which the employee works, will be presented to all "no accident" express drivers throughout the country. It is believed that all but a small percentage of the men on the express trucks will be able to qualify.

The same method of recognition will be followed by the Express Agency during the next four years. Early in 1937, the drivers' records will be studied again and all who have gone two years without accidents will receive their second merit card, signed by the superintendent and general manager. For a three-year no-

Express Drivers Have Always Had the Importance of Careful Driving Kept Constantly Before Them—Education in Safety Matters Is a Regular Feature of Their Training

accident record, merit cards signed by the operating vice-president will be presented and drivers who, in 1940, can claim freedom from vehicle mishaps since 1935 will be given a merit card signed by the president of the company.

Express drivers have had the importance of careful driving kept constantly before them since the days when express vehicles were drawn by horses. When motorization of street express equipment was completed over six years ago, this subject became a regular feature of their training. At the entrance to the driver's seat, every truck carries a metal plate long in use, bearing the words: "Safety First; Pedestrians Have Right of Way; In Case of Doubt, Stop; Take No Chances of Injuring Anyone!"

Men driving express trucks are constantly under supervision as to their competence for this type of work and particular attention is paid to their eye-sight, hearing and mental reflexes. The possession of a state driving license is not enough to qualify an employee for driving an express truck, which is only entrusted to him after he has passed thorough tests, under the direction of a trained supervisor. It is also a fixed rule in the express garages not to send out on the streets any vehicle that is not in good mechanical condition.

Task of Moving Commerce Falls Upon the Railroads

(*Continued from page 320*)

of Rapid City was annulled. The storm on February 8 to 10 made operations in these sections even more difficult and resulted in the annulment of the Corn King Limited, the Iron and Copper Country Express and the Ashland Limited on February 9. In spite of the severity of these blizzards, the "400" was able to operate continuously, the maximum delay being 4 hr. on February 9.

As a result of blizzards in Iowa and Nebraska, the Streamliner-City of Portland did not arrive in Chicago on February 8 until 6 p. m., 15½ hr. late. On the following day, conditions were so bad that it was necessary to cancel the Portland Rose, the Los Angeles Limited and the Overland Limited. The storm on February 13 was so severe that during the night no attempt was made to keep the Fremont-Lander line and lines in the Dakotas open and consequently, all service was annulled.

On the Chicago, Burlington & Quincy the most serious train delays were caused by the February 8 blizzard, which was especially severe at Savanna, Ill., on the Chicago-Twin Cities line and at Galesburg, Ill., the junction of the Omaha, Kansas City and St. Louis lines. Previous storms had delayed coast trains only about 5 hr. but the February 8 blizzard caused the Empire Builder to be 17 hr. late on February 9. As a result of the blockade at Savanna, the Twin Zephyrs were held up on each side of Savanna and were 6 hr. late in arriving on February 9. Consequently, their afternoon departures on that day were annulled. Excessive snow at Galesburg caused Kansas City-Chicago trains to be 4 hr. late and the Ak-Sar-Ben from Omaha Neb., 11 hr. late on February 8 at Chicago.

On the Chicago, Rock Island & Pacific the Cedar Rapids-Twin Cities, Cedar Rapids-Watertown and Rock Island-Fairbury lines were hit by blizzards on February 4, 8 and 13, and trains ran several hours late. While difficulty on the Rock Island-Fairbury lines prevailed, trains were routed via St. Joseph, Mo. On February 8, the Des Moines-Manley line was out of service for 48 hr. The storm on February 13 caused trouble between Sibly and Iowa City, between Des Moines and the Twin Cities and between Cedar Rapids and Watertown.

On the Minneapolis, St. Paul & Sault Ste. Marie, snows and subzero temperatures were experienced over the entire system. Temperatures in North Dakota on several occasions reached 45 deg. below zero. The storm of February 8 tied up lines in Wisconsin and Illinois, that portion of the main line into Chicago between Neenah, Wis., and Waukesha being completely out of service for 10 hr.

Odds and Ends . . .

Millionaire

It was not generally known that the late Louis Eckstein, millionaire Chicago publisher and opera patron, was the same Louie Eckstein who was formerly general passenger agent of the Wisconsin Central.

Smallest Tunnel?

Bee Rock tunnel, on the Louisville & Nashville's Cumberland Valley division, near Appalachia, Va., enjoys the distinction of being the smallest "big hole" in the world. It is only 30 ft. long and is said to be not at all popular with newlyweds and the younger generation of trainriders.

All-American

In 1913, the late Walter Camp made his first All-American selection from a football team west of the Mississippi river, in the person of Jim Gallagher, left guard of the University of Missouri. Mr. Gallagher is now district engineer of the Missouri-Kansas-Texas at Denison, Texas, and claims are made that he is the only All-American now in railroad service.

Railway Coach to Be a Church

An unused passenger coach donated by the Rock Island arrived recently on the Lincoln estate, a subdivision a mile east of Frankfort, Ill., where it will serve as a Roman Catholic church. The coach was accepted by members of St. John's Catholic parish in Joliet and was transported on rollers 13 miles to the Lincoln estate. The 15 Catholic families on the estate have never had a church and have held services in a private home. The coach is 60 ft. long and can accommodate 72 persons. It will be remodeled for services within three weeks.

Railroad, Pennsylvania

"Railroad, Pennsylvania," is on the Pennsylvania Railroad. It is on a railroad, yet has no railroad station. Shrewsburg, York County, is the station. "Railroad" is a post office. Yet Shrewsburg, which is 1¼ miles from the railroad, named the town of "Railroad." Years ago (Shrewsburg is over 100 years old) the people of this town would say, "I'm going over to the railroad" or "let's go over to the railroad!" Later when a few buildings were erected at the railroad they "dubbed" it "Railroad" and it still carries that name.

Crossing Watchman Elected Mayor

Ernest E. Estes, Auburn's crossing tender mayor-elect, was just a bit bewildered recently by all the fuss over his surprise election, but he was certain of one thing—he'd do his best for Auburn, Maine. Estes defeated Mayor George C. Wing, Jr., a boyhood schoolmate and a Harvard graduate, by 61 votes. Estes reported for duty as usual at the Hampshire street crossing after his election. A Maine Central employee 40 years, more than half that time on his present job, the 56-year-old Estes said he had no idea of giving up $20.65 a week just because he had been elected mayor at a salary of $450. He ran as a "workingman's candidate."

Communications and Books . . .

Thank You for the Kindly Enthusiasm, Mr. Sherrington

LONDON, ENGLAND

TO THE EDITOR:

We are still standing agape with admiration at the wonderful way you assessed our arrangements here which have appeared in various issues of the *Railway Age*.

C. E. R. SHERRINGTON,
Secretary, Railway Research Service

[Mr. Sherrington, Major J. Dewar (publicity officer, G.W.R.) and Mr. G. H. Loftus-Allen (publicity officer, L.M.S.) and other British railway officers, who have written in most kindly and complimentary terms of our articles on British railway freight and passenger service, and advertising and publicity, modestly neglect to consider the part that they played in the preparation of these articles They gave freely of their time toward assembling information and answering the questions of the *Railway Age's* representative. And to their lively interest and co-operation is largely ascribable whatever of merit they found in the articles.—EDITOR.]

A Bit of Romantic History

SWISSVALE, PA.

TO THE EDITOR:

While the letter of Edwin Swergal in your issue of January 18, 1936, may be "far afield from economics," there can be no doubt that the historic facts, so dramatically cited, were interesting and even inspiring to many railroad men and Railway Express Agency couriers who are readers of your valuable publication today.

That the creators of the advertisement referred to were familiar with at least a portion of the story so ably presented by Mr. Swergal, is evident from the copy and illustration in an advertisement appearing in the June 10, 1933, issue of *Railway Age*, a reduced photographic reproduction of which is enclosed herewith.

Unfortunately space limitations prevent the recital of many dramatic and interesting facts in advertising and a mere hint of the full story is frequently resorted to by copywriters as a necessity. Mr. Swergal has convinced us, however, that even this is effective in creating the desired impression in the mind of the reader. We are all human beings after all and even in an industrial trade paper dramatized advertising has the same appeal as it has in any popular magazine.

Our thanks to Mr. Swergal for his interesting and able letter, and to *Railway Age* for publishing it.

K. E. KELLENBERGER,
Advertising Manager,
Union Switch & Signal Company

New Book

Powerful 4-8-0 Type French Locomotives, by Andre Chapelon. 160 pages, 12 in. by 8⅜ in., paper binding. Published by H. Dunod, 92 Rue Bonaparte (VI), Paris. Price 34 fr. 20.

This pamphlet, which is a reprint of articles which appeared in the Revue Generale de Chemins de Fer, contains a very complete description in French of these remarkable locomotives now in service on the Paris Orleans-Midi. Many illustrations and six large folded plates add to its value. The reasons for various details of the design, the results obtained in service, together with dynamometer car and other test data are given in detail by the author, who was responsible for the design. These locomotives are 4-cylinder compounds with poppet valves. By use of high steam pressure, high superheat and careful designing of steam and exhaust passages, together with a double exhaust system, a design was produced which has shown such high efficiency in operation as to attract world wide attention.

2400 Years Ago-

"NEITHER rain, nor snow, nor heat, nor gloom of night stays these couriers from the swift completion of their appointed rounds". So wrote Herodotus, the Greek Historian, 2400 years ago. How truly descriptive are these words of the service rendered today by trains equipped with "Union" continuously controlled constantly visible cab signals.

Weather conditions, such as fog, smoke, sleet and storm, need no longer be obstacles in maintaining schedules so far as the visibility of signals is concerned. "Union" Cab Signals keep trains moving over the road despite such handicaps. They signal trains every foot of the way and schedule speeds are maintained in dense fogs. This system helps retain the good will of patrons by providing uninterrupted service; it increases the safety of operation and enables users to produce more ton miles per train hour at less cost. Its signals are not misinterpreted for they ride in the cab and are continuously before the engine crew.

Ask our nearest district office what cab signals can do for your road.

Union Switch & Signal Co.
SWISSVALE, PA.

1881 1931

DISTRICT OFFICES
NEW YORK MONTREAL CHICAGO ST. LOUIS SAN FRANCISCO

NEWS

Stop Costly Regulatory Legislation, Says Pelley

Such relief is paramount need, A. A. R. president says—Also tells of new equipment tests

What the railroads need as much as anything else is the adoption of a policy, national and state, to stop further legislation or regulations which only add to the cost of railroad operation, J. J. Pelley, president of the Association of American Railroads, told the American Institute of Mining and Metallurgical Engineers on February 20.

Referring to bills affecting labor on railroads pending, Mr. Pelley declared that their enactment would add more than $20 to the cost of transporting each carload of freight. "Great concern is evidenced today about the funded debt of the railroads and the necessity for its reduction," he said, "If governmental authorities, legislative and others, had the same concern about the increase in expenses caused by legislative or regulatory action, we might well feel that there would be an end to such acts as unnecessarily increase the expenses of railroad operation.

"All that can practically be done will be done by the railroads to reduce their operating costs, whether in the direction of unification of terminals, reduction of waste in methods of service, or in other ways. But what advantage will come to shippers or to railroads if the money saved must at once be taken out of the cash drawer to pay increased costs of operation resulting from new legislation or regulations which make impossible continued economies for the railroads without adding anything to their safety, service or revenues?

Mr. Pelley outlined some of the experiments now being conducted on the railroads with lightweight equipment, passenger and freight, made possible by new types of metal alloys and described the construction by the Association of American Railroads of experimental lighweight freight cars. In one type of car, built with ordinary carbon steel, superior design has made possible a weight reduction of two tons under the former standard car, he said. Other cars, built with alloy metals and weighing six or seven tons less than former cars, are now under test.

"If these tests are successful a very large field for the use of lighter weight metals will immediately be opened, provided the costs of such metals are not too high."

"Railroads own today," continued Mr. Pelley, "about 550,000 fewer cars than they did at the high point of ownership and, in addition, are expected to retire 100,000 more this year. Since 1923 there have been put into service 931,000 new cars and 15,500 new locomotives. There have been retired since 1923, 1,230,000 cars and 32,940 locomotives, by reason of obsolescence. Increased efficiency in the better movement of equipment, more prompt handling on the part of shippers, reduction in time out of service for repairs because of the acquisition of so large a number of new cars, have combined to add so much to the serviceability of equipment that it is reasonable to assume that the railroads will be able to furnish adequate service to the public with at least 300,000 fewer cars than were used at the high point of ownership.

"An upturn in business of as much as 20 or 25 per cent will require, however, the addition of a large number of cars. Recent car orders of steam railroads are evidence of their foresight in planning for the future. The great importance and the large field for increased use of improved materials in equipment construction are readily apparent. However, it must be recognized that the railroads, owning nearly 2,000,000 cars, cannot change their equipment or styles from year to year. Their position is different from that of concerns which manufacture things to sell to the public. The railroads buy things to use in producing a service of transportation, and must carefully weigh the advantages of the new against the old before making departures that would result in large expense of doubtful economic value. To change equipment wholesale to meet supposed new conditions would not only be impossible but uneconomical."

Motion to Dismiss Pension Suit Argued

Arguments were heard in the supreme court of the District of Columbia on February 19 on the motion by government attorneys to dismiss the bill of complaint filed by the railroads attacking the constitutionality of the railroad retirement act and the accompanying tax act.

Illinois Central Forms Bureau of Sales Research

The Illinois Central has created a research bureau in its traffic department at Chicago to serve as a clearing house for suggestions looking toward improvements in sales and service on the railroad. In addition, the bureau will conduct original investigations in these and other related fields. The bureau will be directed by Paul Echols, heretofore division freight agent at Omaha, Neb.

Dunn Sees Real Danger of Government Ownership

Not because of any favorable public sentiment, but from lack of activity to prevent it

"There is very real danger of government ownership of railways, not because there is public sentiment for it, but because there is an almost complete lack of public sentiment for doing anything to prevent it," said Samuel O. Dunn, chairman of the Simmons-Boardman Publishing Company and editor of *Railway Age*, in an address on February 11 before the Engineers' Club of New York. "Our railways recently have been drifting rapidly along the same road that has led to government ownership in a large part of the countries of the world. This is the road of bankruptcy. And yet it seems impossible to arouse any public interest in the vitally important problem presented by their condition after six years of depression, or any active sentiment against policies that have helped to reduce them to this condition and are working against improvement of it.

"The greatest mistake that could be made would be to assume that whether we will have government ownership will be determined by whether the public wants it. It probably never will want it. That will make little difference. And it will do little good to argue and adopt resolutions against it. The outcome will be determined by the inexorable logic of political and economic developments. We have been for years following policies that have been undermining the earning capacity of the railway industry. Congress at every session adds to these policies and is confronted with demands for more of them. If they are not reversed, private capital will refuse to go into or stay in the railroad industry. Government will then have to furnish the capital for maintaining railway operation; and government ownership will have become unavoidable.

"Now, already more than one-third of the railroad industry of the United States actually is in bankruptcy, and still more of it would be if it had not been rescued by government loans. Its physical and financial condition is, of course, due principally to the depression, but it is not by any means entirely due to the depression. Before and during the depression our federal and state governments, with the approval of public sentiment, have been turning loose upon the strictly regulated railways' competitors by air, highway and water that not only have not been regu-

lated, but that have been subsidized by annual expenditures of billions of dollars of the public's money to help them take traffic from the railways, beat down railway rates and undermine railway earning capacity.

"And what has been and is being done during the depression to improve railway conditions and prospects? Railway managements are striving valiantly to improve them; but they are being handicapped in every possible way by the very public sentiment that it is generally assumed will prevent government ownership. Within the last three years of the worst depression in history railway operating expenses have been increased $300,000,000 a year by advances in wages and prices caused by government policies that public sentiment would have prevented if it had opposed them. During its last session Congress, which presumably represents public sentiment, passed the Social Security Act, the Railroad Retirement Acts and the Guffey coal bill to add almost $100,000,000 annually more to the operating expenses of an industry of which more than one-third already is in bankruptcy. Do these developments indicate a public sentiment determined to preserve private ownership?

"And in addition to all this the railway labor unions are demanding from Congress legislation for a 6-hour day at 8-hours pay, for increase in the size of train crews and for limitation of the length of trains that would further increase present annual railway operating expenses at least $750,000,000 a year. This proposed legislation would irretrievably bankrupt every railway and compel government ownership.

"Unlike the public, most of the railway labor leaders not only favor government ownership, but know what will determine the issue. There is no more reason, however, for criticising those who favor government ownership and use effective means for promoting it, than there is for criticising those who are opposed to and not only do nothing to prevent it, but actually support policies tending to make it unavoidable. The only way to keep any industry alive and prevent government ownership of it is to make it possible for it to earn enough to pay its operating expenses, taxes and a return on investment. Every pressure group in the country—politicians, farmers, business men, working men—is supporting or disregarding policies tending to make it impossible for the railway industry to do this.

"Business interests are living in a fool's paradise. The adoption of government ownership would do more to advance state socialism in this country than any other single policy that could be adopted and yet business interests are not only doing nothing to prevent the drift toward it, but much to promote it. When they quit relying upon a perfectly inert public sentiment, and begin trying to arouse sentiment against the causes of the drift, there will begin to be some reason for their present perfectly stupid optimism that government ownership will be avoided."

Appropriation Bill Passed

The independent offices appropriation bill, carrying appropriations for the Interstate Commerce Commission, the Railroad Retirement Board, and the National Mediation Board, was passed by the Senate on February 17 and sent to conference with the House.

Thomas A. Gillis Dies

Thomas A. Gillis, who has been assistant secretary of the Interstate Commerce Commission since June 7, 1926, died at his home in Washington, D. C., on February 19.

Industries Established on I. C. in 1935

A total of 194 industries were established along the lines of the Illinois Central in 1935, including 26 different types of business employing approximately 5,000 workers. This is the largest number established in any year since 1929. The total for the six years is 832 industries.

North Western-U. P. Dining Cars Operating Through

The Chicago & North Western-Union Pacific, as a convenience to passengers, is now operating the dining cars of the Los Angeles Limited, the Overland Limited and the Portland Rose on a through basis. Heretofore, these cars have been "cut in" at meal times and "set out" after meal times, the switching often being done late at night.

Commissioners Aitchison and Porter Confirmed

Following a favorable report by the Senate committee on interstate commerce, which had been delayed for a time at the request of Senator Clark, of Missouri, the Senate on February 18 confirmed the President's reappointment of Commissioners Clyde B. Aitchison and Claude R. Porter of the Interstate Commerce Commission for new terms beginning January 1.

Texas Centennial

Nine railroads have signed for or reserved half the available space in the Transportation building at the Texas Centennial Exposition to be held in Dallas on June 6 to November 29. These include the Texas & Pacific; the Missouri Pacific; the Atchison, Topeka & Santa Fe; the Missouri-Kansas-Texas; the Chicago, Burlington & Quincy; the Southern Pacific; the St. Louis Southwestern; the Chicago, Rock Island & Pacific and the National Railways of Mexico. The Railway Express Agency and the Pullman Company have applied for space adjacent to the railroad exhibits.

Southern Dining Cars to Display Resort Posters

Dining cars of the Southern are now provided with large metal frames for the display of views of resorts served by that road in Western North Carolina, Florida, Augusta, Ga., New Orleans, La., and other points. The plan as announced by F. L. Jenkins, passenger traffic manager, contemplates a showing of only views of resort hotels and other scenes in connection with these resorts.

"We have had much favorable comment concerning this innovation," Mr. Jenkins said, "and we hope to feature all of the principal resort cities in our southeastern territory. These pictures add considerably to the refinement and attractiveness of the interior of our dining cars and at the same time prove a medium of advertising and popularizing our Southern resorts and scenery."

Funds For Rivers and Harbors

The House on February 14 passed the War Department appropriation bill including an item of $138,677,899 for river and harbor work, including about $38,000,000 for maintenance. The bill does not list the projects on which the money is to be spent but provides "for the prosecution of such projects heretofore authorized as may be most desirable in the interests of commerce and navigation. It was stated during the debate that the Board of Engineers for Rivers and Harbors proposed to use $25,000,000 of the amount for improvements on the Mississippi river between the Missouri river and Minneapolis.

Automobile Traffic Men Confer with Railroad Representatives

Traffic executives of automobile companies met at Detroit on February 11 with representatives of the Association of American Railroads to consider the rail transportation requirements of the automotive industry, based on production estimated for the next six months. The A.A.R. was represented by W. C. Kendall, chairman, Car Service division; E. F. Bilo, special representative, Washington, D. C.; and A. H. Gass, district manager, Detroit. A statement on the meeting issued by the Automobile Manufacturers Association said that "Based on experience of the industry up to this time with the shipping that has resulted from the early introduction of new models, it was indicated that the railroads will need to continue their program of providing increased facilities to handle this traffic."

Royal Blue Model Contest

The Baltimore & Ohio in conjunction with The Model Craftsman, a publication devoted to model building, has just launched a national contest for the best working model of the Royal Blue—the Baltimore & Ohio's new train between New York and Washington, D. C. Only amateur model builders and groups of amateurs, including railroad model clubs, are eligible to compete in the contest in which prizes totaling $1,150 will be awarded to winners—a first prize of $500; second prize, $300; third prize, $100; fourth prize, $50; and $25 each for the eight next best models.

The competition will close at midnight, November 15, 1936, and prizes will be awarded by five judges to be selected later.

St. Paul Association of Commerce Opposes Government Ownership

The St. Paul (Minn.) Association of Commerce adopted on January 29 a resolution in opposition to government ownership or operation of the railroads. The resolution, pointing out that railroads of

this country have attained a high state of efficiency and service through the initiative of private investment and management, cites, as objections to public control, the wartime experience, the dangers of bureaucracy, the potential burden on the taxpayers, the loss of state and municipal tax revenues, and the disadvantage which would accrue to railroad employees whose "compensation, hours of work, and conditions of employment now compare most favorably with those of the vast majority of federal employees."

Dinner for D. Crombie

Officers of the Canadian National on February 17 gave a dinner in Montreal in honor of David Crombie, recently retired as chief of transportation of the C. N. R. S. J. Hungerford, president of the company, was chairman of the gathering and, with other speakers, eulogized the lengthy and capable service of Mr. Crombie, "the dean of transportation men in Canada," to railroading in general and to the Canadian National System in particular.

The toast to the guest of honor was proposed by Alistair Fraser, K.C., traffic vice-president of the National System, who spoke of the guidance which Mr. Crombie had always given to the younger men in the organization. The gathering was attended by all the Montreal officers of the organization and on their behalf Mr. Crombie was presented with a silver loving cup.

Labor Committees Consider Eastman's Proposed Orders

A special meeting of the Railway Labor Executives' Association and of the three regional labor committees appointed in accordance with provisions of the emergency railroad act was begun at Washington on February 17 for the purpose of considering the attitude of the railroad labor organizations toward Co-ordinator Eastman's proposed orders requiring terminal unification at eleven cities. On the following day Mr. Eastman met with the labor leaders but it was stated that they had not had sufficient time to study the proposals and desired more notice before the orders should be issued. February 27 was set as the tentative date for another meeting and it was expected that at that time Mr. Eastman would be in a position to state when the orders would be issued. The law makes it the duty of the co-ordinator to give reasonable notice to and to confer with the appropriate regional labor committees prior to taking any action or issuing any order which will affect the interest of the employees, and to afford the labor committees reasonable opportunity to present views upon the contemplated action or order.

Minnesota States Rates Held Discriminatory

After a rehearing and new evidence the Interstate Commerce Commission has issued a report finding that intrastate freight rates between points in the state of Minnesota, made or imposed by authority of the state by reason of the refusal of the Railroad and Warehouse Commission to authorize increases corresponding to the emergency charges authorized by the federal commission for interstate rates, result in unjust discrimination against intrastate commerce. It was further found that this unjust discrimination can and should be removed by requiring the railroads to publish rates including the emergency charges. Division 4 of the commission had issued a report finding that no unjust discrimination had been shown and had discontinued its proceeding because the railroads had failed to introduce evidence concerning the relative transportation conditions on state and interstate traffic but the case was reopened to admit additional evidence. Commissioner Aitchison dissented.

Will the Log-Jam Break?

The only thing that appears to be retarding a flood of equipment bonds is the question of the down payment, without which the certificates would be in an entirely different investment category. But even this is not insurmountable. Doubtless there are some Class I roads that even now are able to make such payments out of working capital. Others may have some senior issues in their treasuries which could be used to secure the required sums. In any event, with a market more than eager to absorb hundreds of millions of dollars worth of equipment bonds, and the carriers themselves quite as desirous of improving their service *at an immediate saving*, some solution must be found for the down payment problem. We believe that it will be found, and that a major contribution to one phase of rehabilitation of our railroads on a sound basis is at hand.

—From the Wall Street Journal.

S. P. Adds New Daylight Train

The Southern Pacific on February 16 will add another daylight passenger train between Los Angeles, Cal., and San Francisco, and place its Daylight Limited on a schedule of 11 hr. for the 471 miles, a reduction of 1 hr. 45 min. in the running time. The Daylight Limited will be an air-conditioned train, leaving terminals at 8 a. m. as at present and arriving at 7 p. m. instead of 8:45. The equipment of the present Daylight Limited will become trains No. 71 and 72, leaving San Francisco at 7:45 a. m. and arriving at Los Angeles at 9:15 p. m. Returning, the train will leave Los Angeles at 8:05 a. m. and will arrive in San Francisco at 9:30 p. m. This train will carry the local passengers between these cities. The Coaster will be speeded up 1 hr. 5 min. It will leave San Francisco at 9 p. m. instead of 7:45 p. m. and will arrive in Los Angeles at 11 a. m. instead of 10:50 a. m.

Railway Held Liable for Mail

Railroads are liable for valuable mail lost through the negligence of their employees, according to a decision of the appellate court of Illinois for the First district in a case involving the Illinois Central and the Continental Illinois National Bank & Trust Company. The bank sent $21,974 by registered mail to the Franklin County Coal Company at Royalton, Ill., in August, 1929, and the package was lost while in the care of employees of the Illinois Central. The Aetna Insurance Company, which had insured the package, took the view that the railroad was liable and started suit. According to the evidence, the loss occurred at Ziegler, Ill., on a branch line of the road on August 30, 1929, when the entire crew left the train to engage in a switching operation. The appellate court decision affirms that of a Cook County circuit court.

P. & S. Division Invites Papers

A competition for papers on railway supply work has been announced by Division VI, Purchases and Stores, A. A. R. This contest will be similar to competitions held in previous years and is open to all purchases and stores department employees below the rank of assistant purchasing agent or assistant general storekeeper. The authors of the two best papers will be invited to the next annual meeting of the division and will receive special mention in the annual proceedings. E. J. Lamneck, purchasing agent, Pennsylvania, C. H. Murrin, general storekeeper, Louisville & Nashville, and E. Harty, assistant general storekeeper, Southern Pacific, have been selected to judge the papers entered in the competition. Applicants may choose any subject related to the purchasing or the storing and distributing of material, and must submit their papers to the secretary of the division not later than April 15.

Southern Roads Ask Continuance of Reduced Fare Experiment

The Atlantic Coast Line and other southern railroads that have appointed C. B. Rhodes as agent have applied to the Inter-state Commerce Commission for special permission to continue for an additional experimental period from March 1 to September 30 their reduced basis of passenger fares, including the one-way rate of one and one-half cents a mile in coaches, and reduced Pullman rates, without surcharge. The application refers to the fact that the railroads are now waiting the decision of the commission as a result of its general passenger fare investigation and realize that any order establishing fares differing from the experimental fares now in effect will necessitate a revision of the tariffs, and that it is not practicable to publish in permanent form the present temporary fares under existing conditions.

New Transportation Maps Chart Facilities in Florida

A set of large-scale maps showing all details of the existing transportation system in Florida has been prepared by the Bureau of Public Roads of the U. S. Department of Agriculture in co-operation with the U. S. Geological Survey. The maps are on a scale of 4 miles to the inch and are believed to be the best of the kind yet produced. The set consists of 12 sheets approximately 26 by 36 inches, so arranged as to permit binding on the left margin. The maps show in color the loca-

tion and character of practically all transportation arteries such as the federal-aid and state highway systems, important secondary highway connections, air lanes and landing fields, railroads, pipe lines, navigable channels and canals, thus indicating on one map all the transportation facilities in the state. Such transportation maps are now available for Florida, New Hampshire and Iowa. Sets are obtainable only by purchase from the Superintendent of Documents, Washington, D. C., at 20 cents per sheet.

Burlington Inundation Award Upheld by Court

A decision of the United States district court of St. Paul, Minn., on July 11, 1933, whereby the Chicago, Burlington & Quincy was awarded $240,000 and interest for damages to its property incurred when the level of the Mississippi river was raised by a dam constructed by the government at Hastings, Minn., was upheld by the United States circuit court of appeals at St. Louis, Mo., on February 11. Water from the dam, which is one of the 28 to be built as a part of the government's program for a 9-ft. channel in the Upper Mississippi, overflowed 4½ miles of the railroad's tracks, requiring the tracks to be raised an average of 3 ft.

In October, 1931, the Burlington brought suit for damages and after hearing, three commissioners appointed by the federal court awarded, in January, 1932, the damages asked by the railroad. The case was then appealed to the United States district court at St. Paul and came to trial in April, 1933.

British Roads Promoting "Save to Travel" Plan

British railways are this year concentrating considerable promotional activity on their "Save to Travel" plan which is somewhat analogous to the thrift stamp idea utilized in the United States during the government's wartime financing activities. The plan was introduced by the British roads experimentally some time ago and has now been extended to all stations.

Under the arrangements available through the London, Midland & Scottish, the London & North Eastern and the Southern, prospective travelers are given a card upon which they may accumulate 10 special stamps, each valued at one shilling. When this card is filled it can be exchanged at any office of the issuing road for a 10-shilling voucher and a further card will be issued if desired. The 10-shilling voucher (which can also be purchased independently) bears interest at the rate of about five per cent per year and thus in six months is worth 10 shillings, 3 pence—and in a year it has a value of 10 shillings, 6 pence. The vouchers and stamp cards can be exchanged for all kinds of travel except season and workmen's tickets.

The plan of the Great Western differs from the foregoing in that cards are issued to which six-pence postage stamps can be affixed and redeemed in the same manner at G.W.R. offices.

"Save to Travel Cards," says a recent statement from the British Railway press office, "appeal equally to individual and pleasure party travelers. With their help, the holidays of households, including children and maids, are provided for at a small weekly cost, and scoutmasters and club organizers will find this railway idea helpful for annual camps and outings. The employees of large and small firms can also arrange excursions with the aid of the schemes."

Safety Program for March

L. G. Bentley, chairman of the Committee on Education, Safety Section, Association of American Railroads, has issued circular S 478 for the attention of safety committees in the month of March. It deals particularly with trespassing and conveys numerous striking lessons from the records of the past 10 years. In the years 1925-1934, nearly 30,000 persons were killed while trespassing on railway property —this is about one-half the total number of persons killed on the railroads—and no less than 6,000 of the 30,000 were killed while trespassing on trains. More than three times that number were killed while trespassing on tracks. The trespassers are classed under five heads; persons under 14 years, persons 14 to 21, railway employees off duty, tramps, and other persons; and this last class, "other persons," is made up mainly of local citizens; not tramps, not young and ignorant persons, but the ordinary citizen who would be supposed to be normally cautious.

A striking fact showing the good work of the safety committees during these ten years is the record of railway employees, off duty, killed while trespassing; which total in 1925 was 113, while in 1934 it was only 16. The number of boys and girls under 14 years also fell off quite materially; 209 in the earlier year and 148 in the later. This result, no doubt, may be largely accredited to the educational work done by the railroads in schools and other local institutions.

Cold Weather Boosts Rail Travel South

As a result of subzero weather in the Middle West, travel to the South has increased substantially over the same period last year. Stormy weather, likewise, has increased the number of automobiles which passengers are sending by train to their destinations. The New York Central reports a 30 per cent increase in Florida business. In the period from January 1 to February 5, the Pennsylvania experienced a 22 per cent gain over last year in Florida travel, while for the week-end of February 5, the increase was 35 per cent. Florida business on the Chicago & Eastern Illinois increased 57 per cent in January over the same month last year. On the Illinois Central, from January 15 to February 16, there was a 33 per cent increase in the number of passengers to Florida, while travel to New Orleans, La., increased substantially. On the Chicago, Rock Island & Pacific, since December 1, more than 15,000 passengers have departed for Arizona and California on the Golden State Limited and the Apache. During February, it has been necessary to add 40 overflow cars to these trains. The Atchison, Topeka & Santa Fe, in the period from December 1 to February 10, transported 34,168 passengers to California and Arizona, the total running close to the volume for 1930. On the Chicago & North Western-Union Pacific, California ticket sales at the city ticket office at Chicago showed an increase of 69 per cent in January, as compared with January, 1934.

The National Railways of Mexico estimated travel to Mexico twice as heavy as last year. It had 800 passengers from Chicago alone during January.

Fairweather Has Faith in C.N.R. Earning Power

Assurance that the Canadian National was being financed on a solid basis was given recently at Moncton, N. B., by S. W. Fairweather of Montreal, director of the railway's bureau of economics, in an address on "some misconceptions of the Canadian National Railways."

The speaker pictured a time in the near future "with any considerable increase in traffic," deficits would disappear and "at higher levels" the system would easily pay interest on its bonds and would return a dividend to the government.

The address was an answer to critics of the government-owned railway who had "misconceptions" of the system's vast debt, $1,000,000,000 of which was acquired at the time the properties were taken over by the Dominion, Mr. Fairweather said.

"What would you think of a business," he asked, "that came through the greatest depression in history, paying all of its cash expenses except a return on capital, a property which in 1928 had earned $45,000,000 as a return on invested capital, and which, should the general conditions of 1928 come back, would yield a return of $60,000,000 on invested capital by reason of improvements in the property and in efficiency? Would you say this property is defunct—it is not good—it will never pay its way?"

The speaker contended the C.N.R. system in 1928 stood fifth of all railway systems on the North American continent, in order of net income available for interest charges.

"Can anyone who has a knowledge of such a demonstrated performance, and has any faith in Canada, have any doubt as to the real value of the Canadian National System?" Mr. Fairweather queried his audience.

Some critics had said it would be good business for Canada to sell the Canadian National for $1,000, "presumably feeling that by so doing the country would be better off financially."

"Nothing is further from the truth," was the economic bureau director's reply to these critics.

Lake Cargo Coal Demurrage Investigation

The Interstate Commerce Commission has announced a hearing to be held at Cleveland, Ohio, on March 10 before Director Bartel of its Bureau of Service in connection with its investigation of alleged abuses in connection with the handling of demurrage on lake cargo coal. According to the notice, this investigation is intended to establish facts con-

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MODERN POWER

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EVERY modern locomotive is a distinct aid in reducing costs and increasing earning capacity.

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LIMA LOCOMOTIVE WORKS LIMA LOCOMOTIVE WORKS INCORPORATED INCORPORATED, LIMA, OHIO

cerning the rules, regulations, services, charges, and practices indicated below:

(1) Proportion of coal shipped from mines on each railroad forwarded to lake ports; and practices in connection with weighing and billing, including minimum weights.

(2) Holding of lake coal at intermediate points.

(3) Location, description, and capacity of yards at lake ports; and services and practices therein pertaining to lake coal at ports, including classification for transshipment. Ownership of tracks, and operating agreements and arrangements—if any—involved; and handling of cars between storage tracks and docks.

(4) Description of docks, piers or wharves; ownership, value, and cost of maintenance. Who operates; and, if other than owner, under what terms and arrangements. What dredging is necessary, if any, the cost thereof, and at whose expense performed.

(5) Car-dumping or unloading facilities; type, capacity, age, value, and cost of operation and maintenance. How, by whom, and under what terms, operated; cost of transfer of coal to vessel; charges for transfer and who bears the expense. To whom do such charges accrue?

(6) Ownership and control of vessels, and regulations and practices governing their registration and docking.

(7) Demurrage rules and charges applicable on lake coal for car detention at the ports.

The object is to inquire into the lawfulness of the present charges (other than line-haul rates), rules, regulations, services, and practices on coal, in carloads, consigned to lake ports for transshipment by vessel. For the purpose of this inquiry it is desired that the respondent carriers have present at the assigned hearing such of their officers as from practical acquaintance with the specified subjects are able to furnish the desired information, and respond intelligently to examination with respect thereto. Respondents will be expected to explain the object of the Ore and Coal Exchange, its organization, by whom operated, cost of operation and by whom borne, and its authority as well as the practices and methods employed in connection with rail movements and vessel assignments. Each respondent as called should be prepared on its own initiative to describe and define the charges, rules, regulations, services, and practices here the subject of inquiry.

Club Meetings

The Northwest Car Men's Association will hold its next meeting at the Midway Club Rooms, St. Paul, Minn., on Monday evening, March 2. J. J. McDermott, representative of the Bureau of Explosives, will speak on inspection and interchange of cars of explosives.

The Canadian Railway Club will hold its next meeting on Monday, March 9, at the Windsor Hotel, Montreal. Mr. Anderson, of the Sturtevant Company, Boston, will present an illustrated paper on air conditioning of cars.

The Western Railway Club will hold its next meeting at Hotel Sherman, Chicago, on Monday evening, March 9. Robert Faries, M.W. department, Pennsylvania, Philadelphia, will speak on track structure.

The Car Foremen's Association of Chicago will hold its next meeting at La Salle Hotel, Chicago, on Monday, March 9, at 8 p.m. daylight-saving time. There will be a discussion of proposed changes in the rules of interchange.

The Car Foremen's Association of Omaha (Neb.) will hold its next meeting at the Union Pacific shops, on Thursday, March 12, at 1:15 p.m. There will be a discussion on the interchange rules.

The Southern and Southwestern Railway Club will hold its next meeting at the Ansley Hotel, Atlanta, Ga., on Thursday, March 19, at 10 a.m. Operation of flame-cutting machines will be discussed by James Grant, Atlantic Coast Line, and F. C. Hasse, Oxweld Railroad Service Co.

The Traffic Club of Cleveland (Ohio) held its annual dinner at the Hollenden Hotel, Cleveland, on February 6, with an attendance of about 900. Presiding at the dinner was President Thomas A. Dowdell, general agent of the Pittsburgh & West Virginia. One of the features of the meeting was a sketch by W. G. Rose, commemorating the hundredth year of the corporate life of the city of Cleveland. The Great Lakes Exposition is to be held on the Cleveland lake front this coming summer.

The annual dinner of the Traffic Club of the Rochester (N. Y.) Chamber of Commerce will be held on February 25 with R. F. Bohman, general traffic manager, Heywood-Wakefield Company, Gardner, Mass., as the principal speaker. Mr. Bohman will take as his subject "The Fallacy of Government Operation of Railroads." A feature of the meeting will be an exhibit of model railroad equipment, including rolling stock, tracks and other facilities, displayed by the Rochester Model Railroad Club. The exhibit will remain on display in the Chamber of Commerce building for a week following the dinner.

The next regular meeting of the Eastern Car Foreman's Association will be held in the Engineering Societies building, 29 West Thirty-ninth street, New York City, at 8 p.m., on Friday, February 28, in room 502. The subject: Wheels, by F. K. Vial, of the Association of Manufacturers of Chilled Car Wheels.

The Railway Club of Pittsburgh (Pa.) will hold its next meeting at the Fort Pitt Hotel, Pittsburgh, on Thursday evening, February 27. L. W. Wallace, director of the Equipment Research division of the Association of American Railroads, will speak on railroad research problems.

The next monthly meeting of the New York Section of the American Welding Society will be held on Tuesday evening, March 10, at 8 p.m., in the Engineering Societies building, 29 West Thirty-ninth street, New York, in Room 502. At this meeting a paper will be presented on "Low-Alloy, High Tensile Steels" by A. B. Kinzel, chief metallurgist, Union Carbide and Carbon Research Laboratories, and another paper on "Applications of Low-Alloy, High Tensile Steels" by H. M. Priest, engineer, Railroad Research bureau, Subsidiary Manufacturing Companies, United States Steel Corporation.

Construction

CHICAGO, ROCK ISLAND & PACIFIC.—A contract has been awarded to the Fox Contracting Company, El Reno, Okla., for the construction of the concrete sub-structure for two 150-ft. steel truss spans which this company is erecting in its bridge across the Republican river at Manhattan, Kan., to replace spans that were washed out in the flood last spring. The steel for the superstructure for these spans is being fabricated by the McClintic-Marshall Corporation.

MINNEAPOLIS, ST. PAUL & SAULT STE. MARIE.—Contracts have recently been awarded by this company to the L. G. Arnold Company, Eau Claire, Wis., for the construction of grade separations at Stanberry, Wis., and Gilman, at costs of $24,000 and $38,000, respectively.

NEW YORK CENTRAL.—A contract has been let to James Stewart & Company for work on the West Side Improvements of this road from 79th street to 82nd street, New York City.

NEW YORK CENTRAL.—A contract has been given to Foley Brothers, Inc., New York, for grade crossing elimination work at Carman, N. Y., at a cost of about $187,000. A contract for 200 tons of reinforcing steel has been let to the Albany Steel & Iron Company; 300 tons of structural steel are also required for this work. See *Railway Age*, issue of December 28, page 879.

NEW YORK, NEW HAVEN & HARTFORD.—This road plans to carry out work for the protection of timber grillages on Bridge No. 5.09 at Neponset, Mass., to cost about $37,000.

PENNSYLVANIA.—The New York Public Service Commission has approved a low bid of $76,816 submitted by the Rust Engineering Company, Pittsburgh, Pa., for the elimination of the Napier crossing of this road on the Franklinville-Machias State Highway in Farmersville, N. Y. The commission has directed the railroad to award the contract and begin work as soon as practicable.

PENNSYLVANIA - READING SEASHORE LINES.—The New Jersey Public Utility Commissioners have ordered the elimination of the Jimmy Lee grade crossing of this road at Estell Manor, N. J. This is to be accomplished by constructing a crossing not at grade of the public highway over the railroad tracks, and the commission ordered the railroad to begin work by April 1.

The commission also ordered that actual construction work be started on the same date eliminating the grade crossing of this road at Weymouth road in Hammonton, N. J., also removing the existing bridge where the Berlin-Cedar Brook road crosses its tracks in Winslow, N. J., and constructing a bridge on a new location to carry the railroad's tracks above the Berlin-Cedar Brook road.

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Protection . . .

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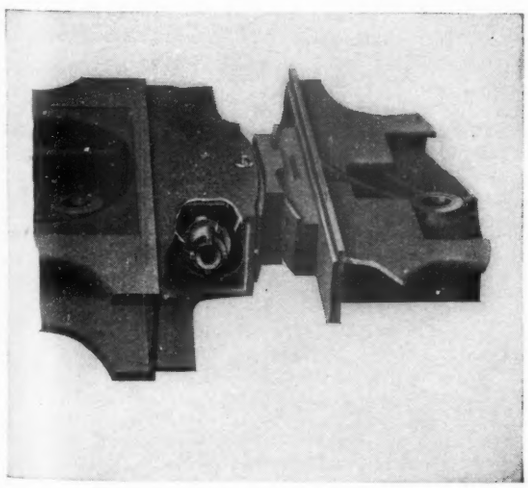
. . .

THAT REDUCES MAINTENANCE COSTS



A smooth riding engine means a smoother riding train and a big reduction in locomotive and track maintenance costs.

Franklin Type E-2 Radial Buffer is like a giant arm that grasps the engine and tender. While permitting absolute freedom of movement it steadies and avoids jars and jolts.

It maintains constant contact between engine and tender and provides spring controlled frictional resistance to compression which avoids lost motion and subsequent destructive shocks.

Like its Twin the Franklin Automatic Compensator and Snubber for Driving Boxes, it materially improves the riding qualities of the engine and saves many times its cost in maintenance expense.

When maintenance is required a replacement part assumes importance equal to that of the device itself and should be purchased with equal care. Use only genuine Franklin repair parts in Franklin equipment.

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NEW YORK CHICAGO MONTREAL

Equipment and Supplies

LOCOMOTIVES

Northern Pacific Equipment Program

The Northern Pacific will spend $4,000,000 for 12 locomotives and 1,000 freight cars and $338,000 for improvements to track, bridges and terminals to permit the operation of these locomotives in the Montana mountain territory between Livingston, Helena and Missoula. Inquiries have been issued for 12 Mallet 4-6-6-4 type, roller bearing locomotives with a tractive power of 106,000 lb., a length of 127 ft. 1¼ in., a height of 16 ft. 4 in., a total weight in working order of 1,025,000 lb., and a tender capacity of 27 tons of coal and 22,000 gal. of water.

THE NEW YORK, NEW HAVEN & HARTFORD is negotiating with locomotive builders for ten new steam locomotives. The purchase of this equipment is subject to the approval of the court.

THE UNION PACIFIC has ordered fifteen 4-6-6-4 type, 4-cylinder simple articulated locomotives for fast freight service on mountain grades from the American Locomotive Company. These locomotives will have 22 in. by 32 in. cylinders, a total weight of engine in working order of 545,000 lb., a tractive effort of 100,000 lb. and twelve 69-in. driving wheels. The tenders will have a capacity of 19,000 gal. of water and 22 tons of coal.

FREIGHT CARS

THE GREAT NORTHERN is inquiring for 500 ore cars of 75 tons' capacity.

PACIFIC FRUIT EXPRESS.—The inquiry for 3,000 refrigerator cars for this company is expected to be issued the end of February.

THE NORTHERN PACIFIC is inquiring for 500 gondola cars of 50 tons' capacity and 250 steel frame flat cars of 50 tons' capacity. This company will build 250 stock cars of 40 tons' capacity in its own shops.

THE MISSOURI PACIFIC has ordered 300 box cars of 40 tons' capacity from the American Car & Foundry Company. These cars are for use on the International Great Northern.

THE ATCHISON, TOPEKA & SANTA FE has ordered 500 box cars of 50 tons' capacity from the Pullman-Standard Car Manufacturing Company. Inquiry for this equipment was reported in the *Railway Age* of December 28.

THE NEW YORK, NEW HAVEN & HARTFORD program for 1936 includes applying cast steel side frames in place of arch bar side frames on some 2,500 freight cars and making such other repairs as required, including painting.

CHICAGO, MILWAUKEE, ST. PAUL & PACIFIC.—The General American Transportation Corporation will build 250 steel sheathed refrigerator cars for the Union Refrigerator Transit Company, which will lease them to the Chicago, Milwaukee, St. Paul & Pacific.

PASSENGER CARS

THE NEW YORK, NEW HAVEN & HARTFORD is now inquiring for 50 passenger coaches, each with a capacity of 92 passengers, which are to be similar in most respects to the 50 bought by this company in 1934. The purchase of this equipment is subject to the court's approval.

IRON AND STEEL

THE CHICAGO, MILWAUKEE, ST. PAUL & PACIFIC is inquiring for 28,000 tons of rails.

THE CHICAGO, ROCK ISLAND & PACIFIC is considering the purchase of approximately 35,000 tons of rails.

THE ST. LOUIS SOUTHWESTERN has ordered 1,500 tons of rail, having let 1,000 tons to the Carnegie-Illinois Steel Corporation and 500 tons to the Bethlehem Steel Company.

NEW YORK CENTRAL.—A contract has been let through Foley Brothers, Inc., contractors, to the Albany Steel & Iron Company for 200 tons of reinforcing steel, to be used on grade crossing elimination work at Carman, N. Y.

AIR CONDITIONING

THE READING and CENTRAL OF NEW JERSEY have authorized a program of installing air-conditioning equipment in 21 passenger cars as follows: On the Reading, 11 coaches, 3 combination cars and 2 cafe cars; on the Central of New Jersey, 3 coaches and 2 combination cars.

THE NEW YORK, NEW HAVEN & HARTFORD has been granted permission by the United States District Court for Connecticut to air condition 46 of its passenger cars with ice units, which have been purchased from the B. F. Sturtevant Company, and 15 electro-mechanical and 1 ice unit purchased from the Safety Car Heating & Lighting Company. An additional 26 cars on this road belonging to the Pullman Company will also be air conditioned.

TRADE PUBLICATION

ALLEGHENY STAINLESS STEEL.—This is the subject of an unusually elaborate 10-page brochure printed in color, which has been issued by Joseph T. Ryerson & Sons, Inc., Chicago. This booklet, which points out the advantages and the uses of stainless steel, is 11 in. by 14 in. in size. An unusual feature is a 2-page illustration, printed in several colors, showing a large variety of products that can be created from stainless steel.

Supply Trade

The **Toncan Culvert Manufacturers Association** has moved its offices from Youngstown, Ohio, to the Republic building, Cleveland, Ohio.

F. A. Faron, in charge of the transportation department at New Haven, Conn., of the **General Electric Company,** has been appointed manager of the New Haven office.

A. C. Smith has been appointed eastern representative of the **Signal Accessories Corporation,** Utica, N. Y., with headquarters in New York, for New York, New Jersey, Pennsylvania and the New England states.

R. D. Bartlett, general manager of the **Franklin Steel Works,** Franklin, Pa., has been appointed assistant to the president of the **Chicago Railway Equipment Company,** with headquarters at Chicago.

Charles R. Surface has been appointed sales manager of the P & H Electric Motor Sales division of the **Harnischfeger Corporation,** Milwaukee, Wis. Mr. Surface is located in the home office in Milwaukee, and is in charge of sales covering motors and electric plants.

Harry B. Clapp, who for 15 years has specialized in railroad and marine freight-handling work, has joined the staff as transportation engineer of the **Clark Tructractor Company,** Battle Creek, Mich. Mr. Clapp will have his headquarters at Battle Creek, as special engineering assistant to **Ezra W. Clark,** vice-president.

J. M. Lammedee, formerly sales engineer of the **Worthington Pump & Machinery Corporation,** with headquarters at Chicago, has been appointed mechanical engineer of the **Wilson Engineering Corporation,** to succeed **V. E. McCoy,** who has resigned to become mechanical engineer of the **Sullivan Valve & Engineering Corporation,** Butte, Mont.

R. S. Stimson in the general office of the **Ingot Iron Railway Products Company,** Middletown, Ohio, has been promoted to district manager in charge of an office recently opened in the State-Planters Bank building, Richmond, Va. Previous to his service with this company Mr. Stimson was for 13 years in the engineering department of the Chicago, Burlington & Quincy.

Frederick H. Thompson, vice-president and director of the **Simmons-Boardman Publishing Company,** publisher of *Railway Age,* has been elected also to the board of directors of its parent company —the **Simmons-Boardman Publishing Corporation**—and **Frederick C. Koch,** also a vice-president of the former, has been elected to its directorate. The elections took place on February 10 at the respective annual meetings of the two corporations which were held in New York.

Mr. Thompson, who was born in Cleve-

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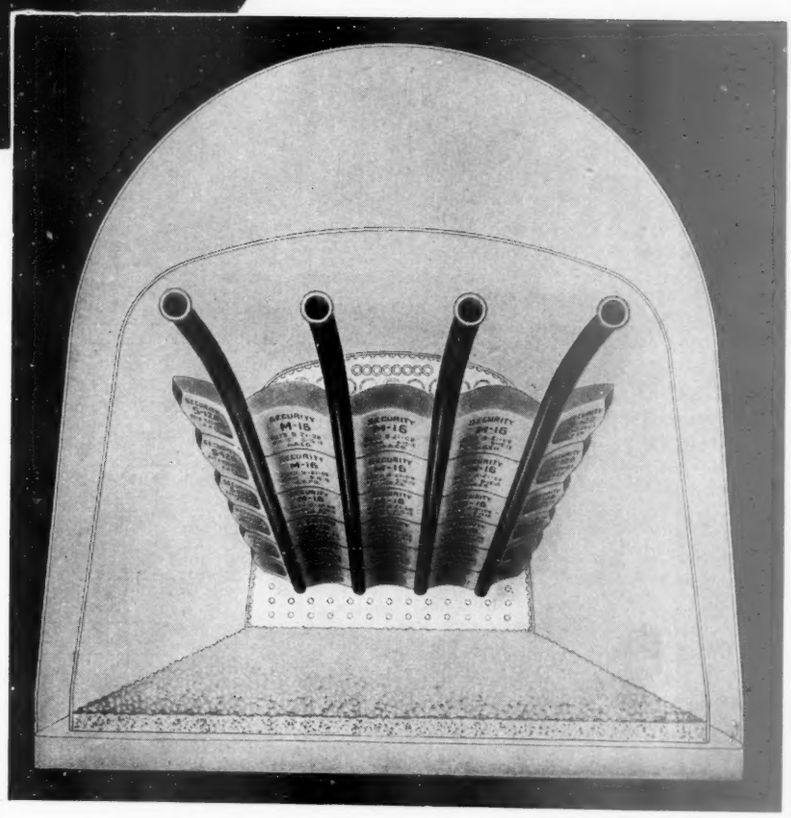

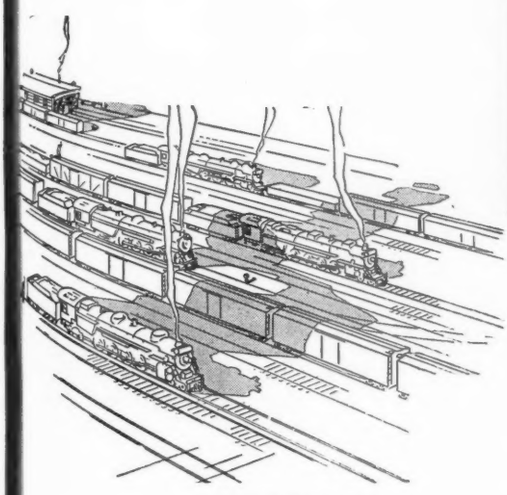

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A full Security Brick Arch is fundamentally essential.

No matter how carefully the locomotive is designed or operated, maximum fuel economy cannot be obtained without it.

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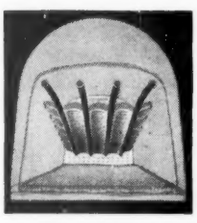

AMERICAN ARCH CO.
INCORPORATED

Locomotive Combustion Specialists » » »

land, Ohio, started his business career in 1902 as a newspaper reporter in New York and served for a time as a dramatic critic. From 1904 to 1907 he was eastern representative of the Music Trade Review, becoming in the latter year business manager of the American Engineer and

Frederick H. Thompson

Railroad Journal, a position which he held until 1912, when that publication was merged into the Railway Mechanical Engineer, a Simmons-Boardman publication. Shortly after the merger Mr. Thompson joined the Simmons-Boardman organization as business manager of the Railway Mechanical Engineer, serving in that connection from 1912 until 1920, when he was appointed general manager for the Simmons-Boardman Publishing Company in the Central district, with headquarters at Cleveland, Ohio. In 1924 Mr. Thompson was elected a vice-president. He was elected to the Simmons-Boardman Publishing Company directorate in 1931.

Frederick C. Koch was born in Jersey City, N. J., on June 9, 1893, and was educated in the public schools of New York. He entered the employ of the Railway Age-Gazette in 1909 in a minor capacity

Frederick C. Koch

and rose through various clerical positions to the managership of the advertising make-up department. In 1917 he became advertising sales representative for all Simmons-Boardman transportation publications with the title of assistant to vice-president. In 1925 he was appointed business manager of Railway Engineering and Maintenance, which position he still holds along with the vice-presidency of the Simmons-Boardman Publishing Company to which he was elected in 1931.

American Brake Shoe and Foundry Company Annual Report

The American Brake Shoe and Foundry Company, for the year ended December 31, 1935, reported a consolidated net income of $1,699,400 after all deductions, including $926,618 for depreciation. This 1935 net compares with $1,169,341 in 1934 and was equivalent after preferred dividends to $1.70 per share on the outstanding common stock.

The consolidated balance sheet as of December 31, 1935, lists total current liabilities of $1,130,888 as against $10,475,061 in current assets, including $3,093,350 in cash alone.

The consolidated income and surplus account as of the close of the past two years follows:

The American Brake Shoe and Foundry Company

Consolidated Income and Surplus Account for Years Ended December 31, 1935 and December 31, 1934

	1935	1934
Earnings before depreciation and income taxes	$2,729,539	$2,081,770
Dividends received from subsidiary companies not consolidated*	107,518	95,362
Total	$2,837,057	$2,177,132
Less:		
Provision for depreciation	$926,618	$835,957
Provision for U. S. and foreign income taxes	211,039	171,834
	$1,137,657	$1,007,791
Net income†	$1,699,400	$1,169,341
Surplus beginning of year	9,297,468	9,295,548
Additions		
Treasury stock adjusted to stated value	.....	1,114
Reserve for claims no longer required	.....	65,891
	$10,996,868	$10,531,894
Deductions		
Dividends Paid—Cash:		
Preferred stock—$7.00 per share	$662,235	$662,235
Common stock $1.25 per share in 1935, $.80 per share in 1934	764,615	489,354
Transferred to reserve for contingencies	.....	65,891
Loss on sale of Welland, Ontario, plant	.....	16,946
Surplus of subsidiary company no longer consolidated	166,341	.....
	$1,593,191	$1,234,426
Surplus end of year	$9,403,677	$9,297,468

*Dividends received from subsidiary companies not consolidated exceed the company's proportion of their combined earnings by $116,542.22 in 1935 and by $117,886.52 in 1934.

† Without gain of $104,442.45 in 1935 and without loss of $1,186.12 in 1934 transferred to reserve for general contingencies, being the sum of or difference between the gain from revaluation to quoted market value at the end of the year of U. S. Government and marketable securities and the profit or loss for the year on sales of securities.

Chicago Railway Equipment Company

The annual report of the Chicago Railway Equipment Company for 1935 shows a profit of $9,011, compared with a profit of $61,289 in 1934. The profit from operation, after deducting manufacturing, selling and administrative expenses, amounted to $68,287, while income from investments, rentals and the profit on the sale of securities, amounted to $40,724. From this was deducted $100,000 for depreciation of plant and equipment, leaving a net profit of $9,011, and increasing the earned surplus (which, on December 31, 1934, amounted to $96,563) to $105,575 as of December 31, 1935.

A. C. Moore, president, in his report to stockholders, said:

"The gross sales in the railroad division actually decreased, a major influence being the fact that new freight cars, for which parts were required and which were actually constructed during the period, amounted to approximately 40 per cent less than in 1934. In the railroad field, the outlook for considerably increased purchases is encouraging. While it is true that at the present time the largest total railway mileage on record is in receivership or bankruptcy, the market has never been more favorable for supplying funds for re-equipping and rejuvenating that part of the railway industry which is solvent. Even those roads operating under court direction may, until their credit position is improved through financial reorganization, provide funds by means of receiver or trustee certificates for purposes which will add to the earning power of the properties. Retirements of obsolete freight cars over the past five years have exceeded the purchase of new cars by an average of more than 80,000 units per year, essentially lessening the available capacity. Taking this and the decided increase in percentage of bad order cars into consideration, and combining with it the assumption that the upward trend in railway traffic will continue, it is logical to predict a substantial purchase of new equipment by the railroads over the next two or three years, with promise of a fair start during 1936."

Baldwin Locomotive Works Annual Report for 1935

The Baldwin Locomotive Works and subsidiaries, including the Midvale Company, reported for the year ended December 31, 1935, a consolidated net loss after all charges of $2,119,738, as compared with a consolidated net loss of $3,698,494 reported for 1934.

Consolidated sales for 1935, exclusive of inter-company transactions, totaled $19,462,746, compared with $14,554,444 in 1934. Sales of locomotive products were $6,484,928, against $3,396,733. Sixty-seven per cent of the total volume of business was outside the locomotive field as compared with 77 per cent for the year 1934. Consolidated unfilled orders on hand at the end of the year stood at $6,689,081, as compared with $9,462,712 at the beginning of 1935.

"The outlook for the immedia' ure continues uncertain," President George H. Houston declares in his remarks to stockholders. "The locomotive inventory of Class I railroads has been reduced, largely by demolition, from about 64,000 locomotives at the beginning of 1926 to about 45,500 at the end of 1935. Carloadings, with the resulting motive power requirements, have increased to a place where the reserve of stored, serviceable locomotives is

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THE SUPERHEATER COMPANY

NEW YORK ELESCO CHICAGO

THE ELESCO EXHAUST STEAM INJECTOR IS EFFECTIVE AS A FEED WATER HEATER

SIMPLE • RELIABLE • ECONOMICAL

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MONTREAL
The Superheater Co., Ltd.
Dominion Square Bldg.

CHICAGO
Peoples Gas Bldg.

REPRESENTATIVE OF AMERICAN THROTTLE COMPANY, INC.

little, if any, greater than it was at the peak of traffic in 1929. There is little question but what a large potential demand has been accumulated, not only through this reduction in the aggregate volume of existing equipment, but also because of its advancing age. More than 91 per cent of this inventory, measured in aggregate tractive power, was installed prior to 1926, and, therefore, is more than ten years of age. It is impossible to say when this potential demand will be released but each increase in carloadings is bringing it nearer. In the meantime this demand is continuing to accumulate.

"The demand for Baldwin products other than locomotives has increased each year since 1933. Baldwin's consolidated activities for the year as a whole, outside of its domestic locomotive business, resulted in a net profit after provision for depreciation and all other charges but before provision for interest on the parent company's funded debt."

Mr. Houston concludes his remarks by giving in detail the progress of the company through the courts following the filing of its petition a year ago under Section 77B of the federal bankruptcy act. He indicates that the company expects to seek approval of the reorganization plan from stockholders and bondholders immediately the court hands down its order so authorizing it.

Operations of the Midvale Company (partially owned subsidiary of the Baldwin Locomotive Works) for the year ended December 31, last, showed a net profit of $496,084, after accruing a reserve for depreciation of $460,000, according to the annual report made public by Harry L. Frevert, president. This compared with a net profit of $632,591 the previous year.

The consolidated statement of profit and loss the year ended December 31, 1935, follows:

The Baldwin Locomotive Works

Consolidated Statement of Profit and Loss for the Year Ended December 31, 1935

Sales		$19,462,746
Less:		
Cost of Sales, including Selling, Administrative and General Expenses.	$18,666,746	
Provision for Depreciation	1,852,409	
		20,519,155
Operating Loss		$1,056,409
Other Income:		
Dividends	$32,590	
Interest and Discount.	365,914*	
Miscellaneous	87,093	
		485,597
Operating Loss less other Income		$570,812
Other Expenses:		
Interest	$1,088,046*	
Miscellaneous	220,101	
Provision for Federal Income Tax	52,500	
		1,360,647
Loss for the Year		$1,931,459
Equity of Minority Stockholders in:		
Net Profit of The Midvale Company	$191,240	
Loss of The Whitcomb Locomotive Company	2,961	
		188,279
Loss Accrued to the Baldwin Locomotive Works Consolidated	$2,119,738	

* Each of these amounts includes $321,300 of interest accrued but not paid on First Mortgage Bonds held in the Sinking Fund.

Financial

CHICAGO & NORTH WESTERN.—*Abandonment.*—The Interstate Commerce Commission has authorized the trustee of this company to abandon that part of a branch line extending from a point near Hurley, Wis., southwesterly to Pence, 6.3 miles.

CHICAGO, INDIANAPOLIS & LOUISVILLE.—*Reorganization Delay.*—The deadline for filing a plan of reorganization under Section 77 of the federal bankruptcy law for the Chicago, Indianapolis & Louisville was extended for six months by the district court at Chicago on February 15. Under the court's original order presentation of a plan was required by February 27.

CHICAGO, MILWAUKEE, ST. PAUL & PACIFIC.—*Acquisition.*—The trustees have applied to the Interstate Commerce Commission for authority to acquire part of a branch line of the Minneapolis & St. Louis from Storm Lake, Ia., to Rembrandt, 12 miles.

CHICAGO, ROCK ISLAND & PACIFIC.—*Abandonment.*—The trustees have applied to the Interstate Commerce Commission for authority to abandon a branch line from Preemption, Ill., to Sherrard, 4.46 miles.

CHICAGO, ROCK ISLAND & PACIFIC.—*Reorganization Delay.*—The federal district court at Chicago on February 11, granted the Rock Island an extension of six months from February 27, within which to file a plan of reorganization under Section 77 of the amended bankruptcy law. Uncertainty of earnings and unsettled conditions make it impossible to draw up a workable reorganization plan at this time, according to counsel.

ERIE.—*Equipment Loan.*—The Interstate Commerce Commission has authorized a modification in previous P.W.A. loan authorizations to this company to permit the further borrowing of $2,275,000 with which to purchase 500 box cars and 300 automobile cars, 100 of the latter to be fitted with loaders.

FT. WORTH & RIO GRANDE.—*Purchase.*—The Atchison, Topeka & Santa Fe plans to purchase the Ft. Worth & Rio Grande, owned by the St. Louis-San Francisco, for $1,520,000. The Rio Grande was incorporated on June 1, 1885, in Texas, and became part of the Texas lines of the Frisco under a legislative act of the state signed on March 29, 1923. It operates 233.46 miles of line, of which 231 miles lie between Ft. Worth and Menard and 2.46 miles are between the Belt Junction and the Missouri-Kansas-Texas crossing at Ft. Worth. Of the mileage, 11.78 miles are operated under trackage rights. All the $2,928,300 of capital stock and the $4,467,000 first mortgage four per cent gold bonds are owned by the Frisco and are pledged under that company's prior lien mortgage.

GREAT NORTHERN.—*Abandonment.*—Examiner J. S. Prichard of the Interstate Commerce Commission has recommended in a proposed report that the commission authorize the abandonment of two segments of line in North Dakota to the international boundary line, 3.55 and 5.32 miles.

LOUISVILLE & NASHVILLE.—*Abandonment.*—This company has applied to the Interstate Commerce Commission for authority to abandon its Perryville branch from Lexington, Tenn., to Decatur, 24.14 miles.

MISSOURI PACIFIC.—*Reorganization Plan.*—Hearings on the reorganization plan before Director O. E. Sweet of the Bureau of Finance of the Interstate Commerce Commission, beginning on February 4, were adjourned on February 13 to March 31.

NEW YORK CENTRAL.—*R.F.C. Loan.*—The Interstate Commerce Commission has authorized the extension until July, 1941, of loans totaling $9,478,737 by the Reconstruction Finance Corporation to this company maturing in 1936; and has approved the substitution of new collateral for that securing these loans from the R.F.C.

NEW YORK CENTRAL.—*Refinancing.*—W. F. Place, vice-president, in a letter to the Bureau of Finance of the Interstate Commerce Commission, has outlined a plan which the company has had under active consideration for several weeks for refinancing its outstanding bank loans amounting to $62,900,000 on a permanent basis. Such plans have not yet definitely crystallized, he said, but have reached a stage where it is felt that such refinancing can be done through an issue of $15,000,000 or $20,000,000 of well-secured serial notes maturing over a period of five years and an issue of $40,000,000 or $35,000,00 of well-secured collateral bonds, with provision for retirement before maturity of a large amount of such bonds by means of sinking fund payments. The balance of the demand bank loans would be provided for by a five-year collateralized loan. It is expected that a definite program can be submitted and applications for necessary authorization forwarded to the commission by March 1.

PENNSYLVANIA.—*Bonds.*—The Interstate Commerce Commission has authorized this company to modify $60,000,000 of general mortgage 6 per cent bonds due 1970 (and recently released from pledge as collateral) by reducing the interest rate to 3¾ per cent and providing for their earlier redemption, if desirable, together with certain other charges; and to sell $40,000,000 of the issue, as changed, to Kuhn, Loeb & Co. at 96¼, making the average interest cost 3.95 per cent. The company has given notice of its intention to pay off on May 1 all of its 5 per cent 40 year secured bonds, paying a premium of 5 per cent. The company has given notice that the annual meeting of the stockholders will be held on April 14, at which time the stockholders will be asked to authorize an increase in the company's indebtedness to the extent of $75,000,000, to be issued at such time as the directors may decide. This is the customary procedure under the laws of Pennsylvania, i. e., the directors do not increase the funded debt without

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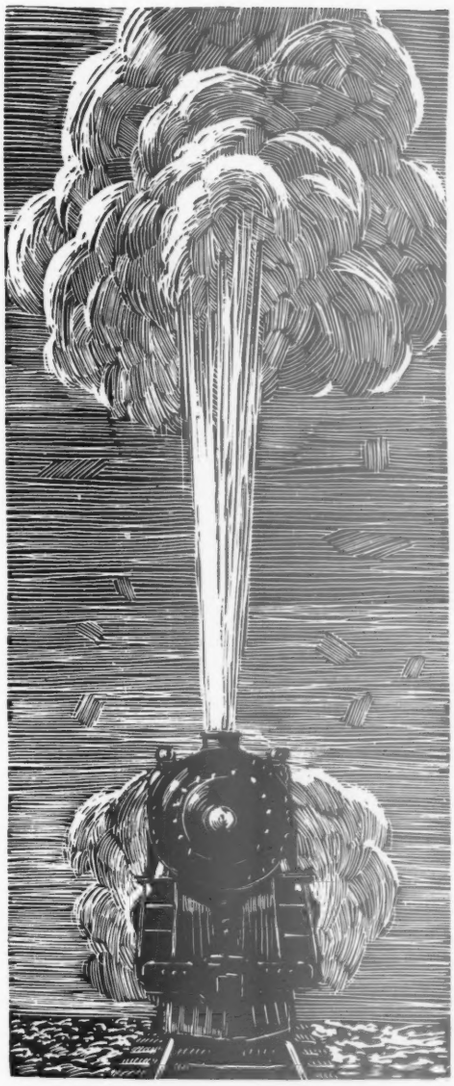
SAFETY



"In excess of 450,000,000 passengers were carried by Class 1 roads in 1935, nearly four times the population of the country. The records available covering twelve months of 1935 show that not one paying passenger was killed last year on Class 1 roads in the United States.

Despite public utterance by the long beards who point out to ignorant masses the inherent dangers of high centers of gravity, yet I tell you that it was ***Steam*** and the ***Steam Locomotive*** that carried safely the preponderance of this army of millions of travellers."

From "STEAM AND THE RAILROADS"
By W. C. DICKERMAN

AMERICAN LOCOMOTIVE COMPANY

ALCO

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first obtaining the authority from the stockholders. This does not, it is explained, mean that the debt is to be issued immediately or that the net debt of the company is to be increased by the amount specified, as the law requires authority of the stockholders for each issuance of new obligations, even though the proceeds may be used in part to pay off previously incurred obligations for which authority had been given at an earlier period.

PIEDMONT & NORTHERN.—*Tentative Valuation.*—The Interstate Commerce Commission has issued a tentative valuation report as of December 31, 1933, finding the final value for rate-making purposes to be $10,500,000.

PORT ISABEL & RIO GRANDE VALLEY.—*R.F.C. Loan.*—This company has applied to the Reconstruction Finance Corporation for a loan of $655,056 for additions and betterments, new equipment, and the liquidation of an outstanding mortgage.

QUANAH, ACME & PACIFIC.—*Abandonment.*—Examiner J. S. Prichard of the Interstate Commerce Commission has recommended in a proposed report that the commission authorize the abandonment of a branch line from Matador to Matador Junction, Tex., 8.08 miles.

READING.—*Bonds.*—The North Pennsylvania has applied to the Interstate Commerce Commission for authority to extend the maturity of $1,500,000 of first mortgage bonds from May 1, 1936, to January 1, 1953, reduce the interest rate from 4 to 3½ per cent, and to sell the bonds to the Prudential Insurance Company at par. The Reading asked authority to assume obligation and liability as lessee of the property.

UNION PACIFIC.—*O. S. L. Abandonment Denied.*—The Interstate Commerce Commission has denied the application of the Oregon Short Line for permission to abandon that portion of its Raft river branch extending from Declo, Idaho, southeasterly to Idahome, 18.7 miles.

Average Prices of Stocks and of Bonds

	Feb. 18	Last week	Last year
Average price of 20 representative railway stocks.	49.96	48.67	33.85
Average price of 20 representative railway bonds.	81.40	81.36	76.17

Dividends Declared

Chesapeake Corporation.—75c, quarterly, payable April 1 to holders of record March 6.

Chesapeake & Ohio.—70c, quarterly, payable April 1 to holders of record March 6; Preferred, $3.25, semi-annually, payable July 1 to holders of record June 8.

Union Pacific.—$1.50; Preferred, $2.00, semi-annually; both payable April 1 to holders of record March 2.

THE RAILROAD CREDIT CORPORATION will make a liquidating distribution to participating carriers on February 29 of $735,711, or 1 per cent of the contributed fund. Of this amount $386,937 will be in cash and $348,774 will be in credits on carriers' indebtedness to the corporation. This will be the twenty-fourth distribution that has been made by the corporation since its liquidation began on June 1, 1933, and will bring the total to $30,171,109 or 41 per cent of the fund administered by the Railroad Credit Corporation.

Railway Officers

EXECUTIVE

Pyeatt Resigns as Operating Head of the D. & R. G. W.

J. S. Pyeatt, president of the Denver & Rio Grande Western, with headquarters at Denver, Colo., has resigned, effective February 1, as operating head of this company but continues as president of the corporation. This road has been operated under trustees since November 18, 1935.

Effective February 7, **R. L. Williams,** senior executive assistant on the Chicago & Eastern Illinois, with headquarters at Chicago, was appointed vice-president.

D. S. Ellis, engineer of motive power of the Advisory Mechanical committee of the Van Sweringen Lines, who has been appointed mechanical assistant to the vice-

D. S. Ellis

president of the Chesapeake & Ohio, the New York, Chicago & St. Louis, and the Pere Marquette, with headquarters at Cleveland, Ohio, as was noted in the *Railway Age* of February 8, was born on January 25, 1897, at Warwick, N. Y. He entered railway service in 1916 as a clerk in the office of the auditor of the Lehigh & Hudson River. In the following year he went with the New York Central as a clerk in the office of the auditor of freight accounts, later serving as a machinist and as acting enginehouse foreman. In 1918, Mr. Ellis became a draftsman and later served as a checker, calculator, designer and traveling engineer. In 1924 he was appointed assistant engineer and in the following year he was made assistant engineer of motive power. On May 1, 1929, Mr. Ellis was appointed Eastern district manager, and subsequently manager, of the Railroad division of the Worthington Pump & Machinery Corporation. On October 1, 1932, he resigned from the service of this company to become engineer of motive power of the Advisory Mechanical committee of the Van Sweringen Lines.

OPERATING

F. G. Cook, trainmaster-roadmaster on the Northern Pacific at Missoula, Mont., has been appointed trainmaster, with headquarters at Lester, Wash., to succeed **J. E. Campbell,** who has retired.

C. A. Fink, assistant superintendent on the Omaha-Northern Kansas divisions of the Missouri Pacific, with headquarters at Atchison, Kan., has been appointed superintendent of the Eastern and Kansas City Terminal divisions, with headquarters at Kansas City, Mo., succeeding **C. C. Chapman,** who has been transferred to the Central Kansas-Colorado divisions, with headquarters at Osawatomie, Kan., to replace **Claude J. Brown,** whose appointment as general manager of the Chicago, Rock Island & Pacific at Kansas City, Mo., was noted in the *Railway Age* of February 8. **C. W. Pace,** trainmaster on the Eastern division at Jefferson City, Mo., has been appointed assistant superintendent of the Omaha-Northern Kansas divisions, to replace Mr. Fink. **F. A. Roberson,** trainmaster on the Eastern division at Cole Junction, Mo., has been transferred, with the same headquarters, to succeed **W. H. Bailey,** who has been transferred to Jefferson City, to succeed Mr. Pace. **E. L. Eustes** has been appointed trainmaster at Cole Junction, to replace Mr. Roberson.

J. S. Miller, assistant superintendent of the Casper-Sheridan divisions of the Chicago, Burlington & Quincy, with headquarters at Casper, Wyo., whose appointment as superintendent of these divisions with the same headquarters was noted in the *Railway Age* of February 8, has been connected with this company continuously for more than 30 years. He was born on October 6, 1884, at Neponset, Ill., and studied two years at the Missouri School of Mines. Mr. Miller entered railway service in August, 1905, with the Burlington, serving as a rodman, assistant foreman, foreman and clerk until 1910. From that year until 1915, he served as general track foreman on construction work on various divisions, then being appointed roadmaster, which position he held on the St. Joseph and Aurora divisions until 1917. In that year Mr. Miller was ap-

J. S. Miller

pointed trainmaster on the Galesburg division, being transferred successively to the Sterling and Casper divisions. In 1933 he was further advanced to assistant superintendent, serving in this capacity on

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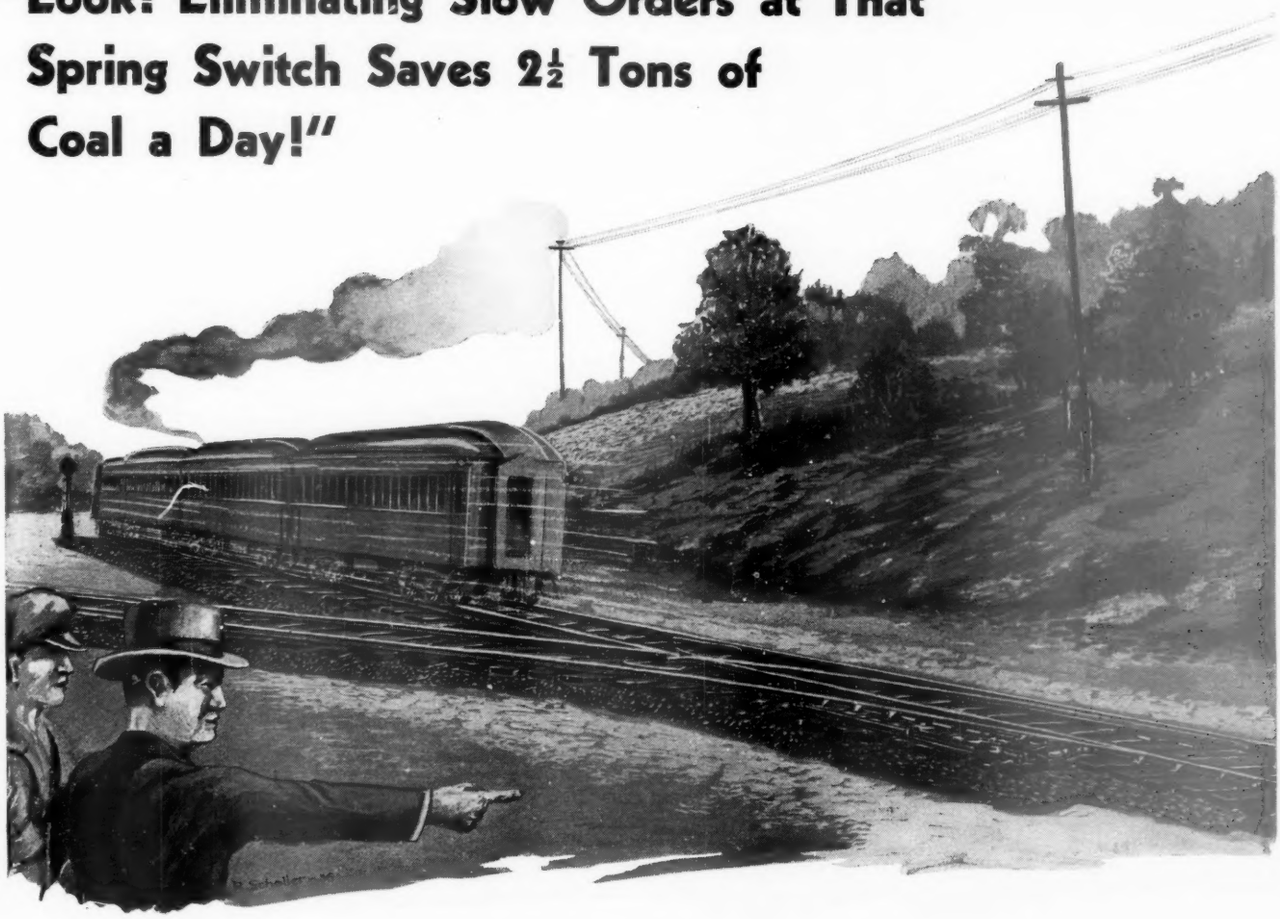
"Look! Eliminating Slow Orders at That Spring Switch Saves 2½ Tons of Coal a Day!"

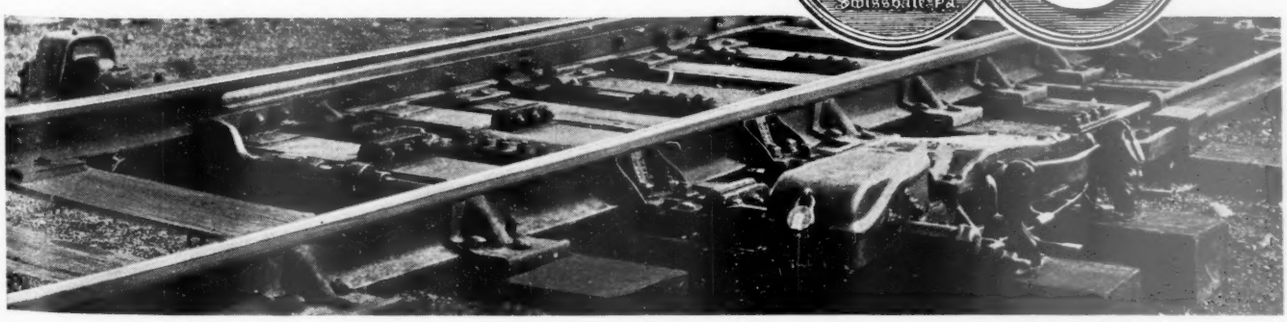


"That spring switch is equipped with the 'Union' Style S-2 Mechanical Facing Point Lock, which makes possible the elimination of slow orders and maintenance of full speed with safety for facing point moves. A mechanically operated device locks the switch points and provides the same protection for facing point moves as at interlockings. Since its installation we are saving, on the basis of $1.75 per ton of coal, $4.35 per day, or $1,569.50 per year; that's about 246 per cent of the cost of installation from the item of coal alone." » » » » » » » » »

You, too, can eliminate slow orders at spring switches, with resultant large savings, by installing this modern facing point lock. » »

Ask our nearest district office for mechanical and operating details. » » » » » »

Union Switch & Signal Co.
Swissvale, Pa.



various divisions until his recent appointment as superintendent of the Casper-Sheridan divisions, effective February 1.

Claude J. Brown, whose appointment as general manager of the Chicago, Rock Island & Pacific, with headquarters at Kansas City, Mo., was noted in the *Railway Age* of February 8, was born on October 14, 1884, at Denison, Tex. After a high school and business college education he entered railway service in 1901 as a yard clerk on the Missouri-Kansas-Texas, serving in various clerical capacities, as secretary to superintendent and

Claude J. Brown

as secretary to general superintendent until 1909. In that year Mr. Brown was appointed trainmaster at Smithville, Tex., later serving as superintendent at the same point. In 1912 he went with the Missouri Pacific as claims assistant at Sedalia, Mo., and after several months in this position he was appointed trainmaster, with headquarters at Illmo, Mo. During the war, Mr. Brown served in France as captain, Eighty-sixth Company, Transportation Corps, United States Army, returning to service on the Missouri Pacific in 1919 as acting division superintendent at Illmo. In 1923 he was appointed assistant superintendent at Sedalia and in the following year he was made superintendent, with headquarters at Falls City, Neb., being transferred to Jefferson City in 1928, and thence to Osawatomie in 1929, where he was located at the time of his recent appointment as general manager on the Rock Island. Mr. Brown has been active in the affairs of the American Association of Railroad Superintendents and at present is second vice-president of that organization.

TRAFFIC

John Erle Roberts, whose appointment as general traffic manager of the Delaware & Hudson at Albany, N. Y., was noted in the *Railway Age* of February 8, was born at Bainbridge, N. Y., on September 23, 1879, and received his education at Bainbridge Academy, Bainbridge, and at Williston Academy, Easthampton, Mass. Mr. Roberts entered railway service in 1892 with the Delaware & Hudson and in 1908 he was appointed chief clerk to the general superintendent transportation. From 1912 to April, 1914, he served as superintendent for the Quebec, Montreal & Southern (now Canadian National) and the Napierville Junction at Sorel, Que., and from April to July, 1914, as general superintendent for the Greenwich & Johnsonville at Greenwich, N. Y. In July, 1914, Mr. Roberts became superintendent of car service for the Delaware & Hudson at Albany and in September, 1920, superintendent of transportation. He was appointed assistant general traffic manager of the Delaware & Hudson in October, 1928, the position he held until his recent appointment as general traffic manager. In 1919 Mr. Roberts was chairman of the sub-committee of the American Railway Association to arrange the settlement between Mexico and various United States railroads covering equipment destroyed during the Mexican War. He was also chairman of the American Railway Association Conference Committee with the United States Coal Commission at Washington, D. C., during 1922 and 1923, and in 1924 he was chairman of the A.R.A. committee appointed to meet with the committee of the National Association of Owners of Railroad Securities for consideration of the latter's car pooling plan and certain proposals relating to unified purchases and repairs to freight cars.

Max V. Beckstedt, whose appointment as assistant general traffic manager for the Delaware & Hudson was noted in the *Railway Age* of February 15, was born at Aultsville, Ont., on September 11, 1889, and received his education at Prescott, Ont., High School and Brockville College. He entered railway service in January, 1905, with the Delaware & Hudson as clerk at Rouses Point, N. Y., and in February, 1907, he became rate clerk at Albany, N. Y. He became soliciting freight agent in June, 1915, and division freight and passenger agent in January, 1916, which position he held successively at Binghamton, N. Y., and Oneonta, N. Y. Mr. Beckstedt became general agent at New York City in July, 1922, and assistant general freight agent at Albany in December, 1926. He was appointed general freight agent in December, 1928, the position he held until his recent appointment as assistant general traffic manager.

William G. Story, whose appointment as freight traffic manager of the Delaware & Hudson at Albany, N. Y., was noted in the *Railway Age* of February 15, was born at Philadelphia, Pa., on September 26, 1879, and attended the public schools and business college. Mr. Story entered railroad service in 1898 with the Pennsylvania and served successively as stenographer, rate clerk and chief rate clerk. He entered the service of the Delaware & Hudson in 1914 as chief clerk in the traffic department and in December, 1917, he was promoted to general freight agent, the position he held until his recent appointment as freight traffic manager in charge of rates and divisions.

Fred W. Nyland, whose appointment as coal traffic manager for the Delaware & Hudson at Albany, N. Y., was noted in the *Railway Age* of February 15, was born on January 9, 1887, at Albany. Mr. Nyland entered railway service in January, 1903, as clerk in the traffic department of the Delaware & Hudson, and in May, 1910, he became chief clerk. In February, 1916, he was appointed clerk in the office of the vice-president and general manager and in August, 1917, he became chief rate clerk in the traffic department. He was appointed special agent in May, 1918, and coal freight agent in March, 1920, which position he held until his recent appointment as coal traffic manager.

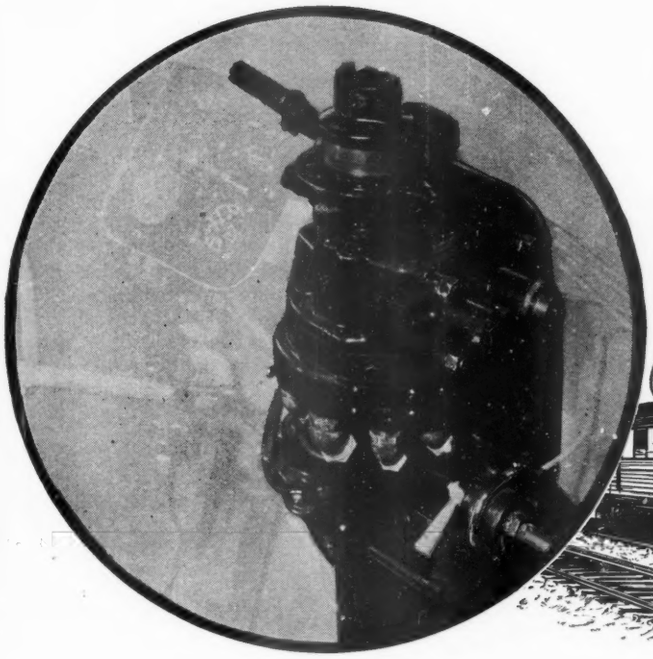
Christopher S. Hallenbeck, whose appointment as general freight agent for the Delaware & Hudson at Albany, N. Y., was noted in the *Railway Age* of February 15, was born on October 25, 1885, at Albany and received his education at Albany High School and La Salle College. He entered railway service in August, 1903, as clerk with the Delaware & Hudson and in June, 1914, he became chief rate clerk; in February, 1916, chief tariff clerk; and in April, 1922, chief of tariff bureau. In December, 1928, Mr. Hallenbeck became assistant general freight agent, the position he held until his recent appointment as general freight agent (rates and divisions).

J. A. Flanders, whose appointment as general freight agent for the Delaware & Hudson at Albany, N. Y., was noted in the *Railway Age* of February 15, was born on November 1, 1886, at Somerville, Mass., and entered railroad service in 1909 with the Boston & Albany. Mr. Flanders entered the service of the Delaware & Hudson in June, 1913, as tariff inspector and in July, 1915, he became soliciting freight agent at Chicago, Ill. He became freight representative at Plattsburg, N. Y., in May, 1918; division freight and passenger agent in February, 1919; and general agent, freight department, at Chicago in March, 1920. Mr. Flanders was appointed assistant general freight agent at Albany in January, 1927, the position he held at the time of his recent appointment as general freight agent (solicitation).

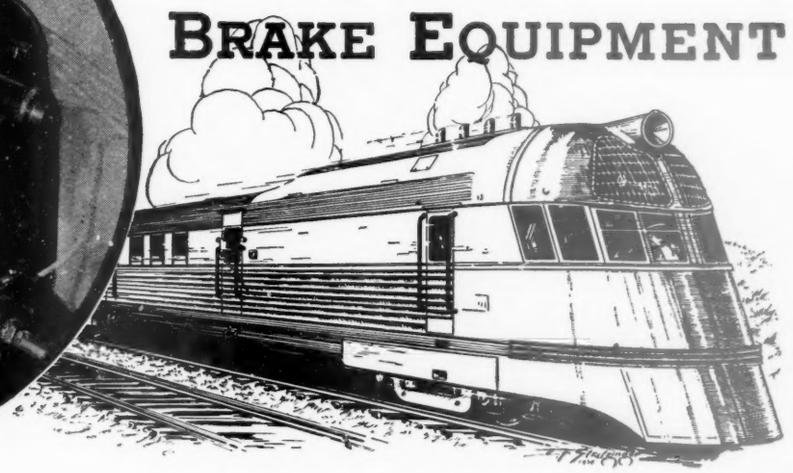
F. Neil Hiller, whose appointment as general freight agent for the Delaware & Hudson at Albany, N. Y., was noted in the *Railway Age* of February 15, was born on July 29, 1889, at Uniondale, Pa., and received his education in the public schools and at Syracuse University. He entered railroad service in September, 1909, as clerk for the Delaware & Hudson and became chief clerk in 1912, which position he held successively at Green Ridge, Pa., and Plymouth, Pa. After service in the United States Army in 1918, Mr. Hiller became chief clerk in the division freight and passenger office at Scranton, Pa., in 1919, and the following year was appointed traveling freight agent at Buffalo, N. Y. Mr. Hiller became chief clerk to general traffic manager in 1920 and chief clerk in the traffic department in 1924. He was appointed assistant general freight agent in 1926, the position he held until his recent appointment as general freight agent (commission rate cases).

Effective February 1, in a rearrangement of the freight traffic department organization of the Southern Pacific Lines in Texas and Louisiana, the lines were

Continued on next left-hand page



WESTINGHOUSE "HSC" BRAKE EQUIPMENT



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These trains present a unique braking problem because of high operating speeds, and permit a distinctive solution because they are self-contained units.

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A Primary System, operated by a self-lapping Brake Valve, provides powerful and flexible braking on all train units simultaneously by Electro-Pneumatic means.

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General Office and Works WILMERDING, PA.

(1298)

divided into four districts, known as the Eastern, Central, Northern and Western districts, each of which is in charge of a general freight agent who reports to the general freight traffic manager at Houston, Tex. **J. Lallande,** general freight agent at New Orleans, La., remains at that point as general freight agent of the Eastern district; **J. E. Carter,** assistant freight traffic manager at Houston, has been appointed general freight agent of the Central district, with the same headquarters; **L. C. Bouchard,** general freight and passenger agent at Dallas, Tex., has been appointed general freight agent of the Northern district with the same headquarters; and **W. C. Barnes,** general freight agent at Dallas, Tex., remains at that point as general freight agent of the Western district. **F. L. Gordon,** gneral freight agent at Houston, has been appointed assistant freight traffic manager (rates and divisions), with the same headquarters.

Charles E. Rolfe, whose retirement from the position of general traffic manager of the Delaware & Hudson was noted in the *Railway Age* of February 8, was born at Nashua, N. H., on May 21, 1854. He received his education in the public schools and Gorham Academy, Gorham, Me., and entered railroad service in January, 1877, with the Portland & Rochester (now Boston & Maine). In 1884 Mr. Rolfe left the service of the Portland & Rochester to become traveling freight agent for the Fitchburg (now B. & M.), which position he held until 1892, when he became division freight agent. From 1896 to 1903 he served as general eastern freight agent for the Delaware & Hudson and from 1903 to 1905 he was assistant general freight agent. From 1905 until 1924 Mr. Rolfe was general freight agent and on the latter date he became assistant general traffic manager. In October, 1928, he became general traffic manager, the position he held until his retirement.

Charles E. Rolfe

Roy E. Barr, coal traffic manager of the Illinois Central, has been appointed assistant traffic manager, with headquarters as before at Chicago. Mr. Barr will remain in direct charge of coal traffic, and in addition will assist the vice-president and the general traffic manager in the administration of sales policies. Born in Mechanicsburg, Ohio, Mr. Barr first entered business in 1902, when he became connected with the American Express Company, Chicago, which company he left a short time later to enter the service of the Illinois Central, where he held various positions in the freight traffic department, becoming particularly concerned with matters pertaining to coal traffic. In 1917 he left this road to join the coal department of the Edward & Bradford Lumber Company as sales manager, serving later as vice-president and subsequently as president of the Great West Coal & Lumber Company. When the Knox Consolidated Coal Company of Indiana was organized, Mr. Barr became its Northwestern manager, with headquarters in Chicago, and in July, 1930, he was appointed manager of the Chicago office of the Consolidated Coal Company. He resigned from the latter position to become general coal agent of the Illinois Central in March, 1932. In July of the same year he was advanced to coal traffic manager, which position he was holding at the time of his recent promotion.

Roy E. Barr

PURCHASES AND STORES

R. D. Long, general storekeeper of the Chicago, Burlington & Quincy, has been appointed purchasing agent, with headquarters as before at Chicago, to succeed **Percival Hunter,** whose death was noted in the *Railway Age* of February 8. Mr. Long has been connected with the Burlington for more than 43 years. He was born on February 22, 1877, at Aurora, Ill., and entered the employ of the Burlington on November 1, 1892, as a messenger at the Aurora store. In March, 1901, after having held various positions at that point, he was promoted to foreman, which position he held until October, 1906, when he was advanced to chief clerk at the Aurora store. Mr. Long was transferred to the office of the general storekeeper at Chicago on February 1, 1910. Four years later he was promoted to assistant general storekeeper at that point and late in 1931 he was further advanced to general storekeeper, which position he has held since.

R. D. Long

Elwyn T. Ricker has been appointed storekeeper for the Maine Central and Portland Terminal Company, with headquarters at Deering Junction, Me.

OBITUARY

H. C. Holzbach, general freight agent on the Chicago, Burlington & Quincy with headquarters at Denver, Colo., died of pneumonia at that place on February 13. A brief biographical sketch of Mr. Holzbach together with a photograph were presented in the *Railway Age* of January 18, in connection with his appointment as general freight agent at Denver.

Lewis K. Marr, assistant to the general superintendent of the New York Zone of the Pennsylvania, died suddenly of cerebral hemorrhage at New York Hospital on February 19. Mr. Marr was born at Rising Sun, Md., on September 2, 1869, and was educated in the public schools of that city. He entered the service of the Pennsylvania in 1887 as a telegraph operator on the Renovo division. In 1894 he was appointed leverman on the Philadelphia Terminal division and two years later was made assistant to the train dispatcher. In February, 1902, he became assistant to the train director and in March, 1904, train director of the Philadelphia Terminal division, which position he held until December, 1909, when he was appointed yardmaster of the same division. Mr. Marr became general yardmaster in charge of passenger train movements at Pennsylvania Station, New York, in 1910. In November, 1911, Mr. Marr was appointed passenger trainmaster of the New York division and in May, 1916, he was appointed terminal passenger trainmaster at New York. In September, 1918, he was promoted to assistant superintendent at Philadelphia, and in October, 1925, was transferred to Jersey City as acting assistant superintendent of the New York division. He became superintendent of the Atlantic division at Camden, N. J., in June, 1926, and in June, 1928, was appointed assistant to the general superintendent of the New Jersey division. Since July, 1931, Mr. Marr has acted in the same capacity on the New York Zone, which embraces the New York division of the Pennsylvania and the entire Long Island railroad.

Operating Revenues and Operating Expenses of Class I Steam Railways in the United States

Compiled From 145 Monthly Reports of Revenues and Expenses Representing 149 Class I Steam Railways

FOR THE MONTH OF DECEMBER, 1935 AND 1934

Item	United States		Eastern District		Southern District		Western District	
	1935	1934	1935	1934	1935	1934	1935	1934
Average number of miles operated	237,083	238,432	58,830	59,045	44,957	45,312	133,296	134,075
Revenues:								
Freight	$234,052,905	$199,355,660	$102,832,034	$86,919,616	$46,536,086	$40,998,808	$84,684,785	$71,437,236
Passenger	34,374,197	32,018,705	19,635,136	18,345,797	4,817,994	4,479,580	9,921,067	9,193,328
Mail	9,619,045	9,336,582	3,637,814	3,474,714	1,627,766	1,601,854	4,353,465	4,260,014
Express	4,895,695	4,844,616	2,132,819	1,781,929	970,222	1,107,145	1,792,654	1,955,542
All other transportation	7,114,700	6,273,478	3,432,977	3,289,256	808,962	606,879	2,872,761	2,377,343
Incidental	5,554,371	5,112,643	3,024,001	2,801,715	858,338	802,219	1,672,032	1,508,709
Joint facility—Cr.	837,185	740,863	259,259	245,018	151,824	157,880	426,102	337,965
Joint facility—Dr.	222,864	174,761	59,354	45,966	21,607	15,490	141,903	113,305
Railway operating revenues	296,225,234	257,507,786	134,894,686	116,812,079	55,749,585	49,738,875	105,580,963	90,956,832
Expenses:								
Maintenance of way and structures	29,937,958	25,333,315	11,753,358	10,101,300	6,435,061	4,804,803	11,749,539	10,427,212
Maintenance of equipment*	62,277,274	48,615,664	27,213,221	21,596,603	14,667,368	9,410,590	20,396,685	17,608,471
Traffic	8,043,898	7,472,474	3,018,930	2,766,772	1,604,719	1,561,609	3,420,249	3,144,093
Transportation	110,789,636	98,278,441	51,443,780	45,375,389	18,424,822	16,462,876	40,921,034	36,440,176
Miscellaneous operations	2,853,782	2,422,249	1,399,221	1,207,753	337,538	299,634	1,117,023	914,862
General	12,472,787	13,084,580	5,622,982	5,679,522	2,119,296	1,697,606	4,730,509	5,707,452
Transportation for investment—Cr.	549,025	452,360	117,234	200,104	66,231	41,283	365,560	210,973
Railway operating expenses	225,826,310	194,754,363	100,334,258	86,527,235	43,522,573	34,195,835	81,969,479	74,031,293
Net revenue from railway operations	70,398,924	62,753,423	34,560,428	30,284,844	12,227,012	15,543,040	23,611,484	16,925,539
Railway tax accruals	14,669,748	13,819,842	5,798,929	6,178,693	3,820,904	2,639,605	5,049,915	5,001,544
Uncollectible railway revenues	178,944	159,528	114,091	91,727	21,105	34,929	43,748	32,872
Railway operating income	55,550,232	48,774,053	28,647,408	24,014,424	8,385,003	12,868,506	18,517,821	11,891,123
Equipment rents—Dr. balance	6,458,499	6,483,809	3,342,536	3,208,616	17,487	300,405	3,098,476	2,974,788
Joint facility rents—Dr. balance	3,054,351	3,064,250	1,915,358	1,924,742	262,396	349,046	876,597	790,462
Net railway operating income	a 46,037,382	b 39,225,994	23,389,514	18,881,066	8,105,120	12,219,055	14,542,748	8,125,873
Ratio of expenses to revenues (per cent)	76.23	75.63	74.38	74.07	78.07	68.75	77.64	81.39
* Includes:								
Depreciation	15,437,001	14,562,695	6,578,047	6,203,223	3,121,866	2,912,162	5,737,088	5,447,310
Retirements	136,304	854,964	57,990	408,026	23,567	271,428	54,747	175,510
Maintenance of equipment before depreciation and retirements	46,703,969	33,198,005	20,577,184	14,985,354	11,521,935	6,227,000	14,604,850	11,985,651
Net railway operating income before depreciation and retirements	61,610,687	54,643,653	30,025,551	25,492,315	11,250,553	15,402,645	20,334,583	13,748,693

FOR TWELVE MONTHS ENDED WITH DECEMBER, 1935 AND 1934

Average number of miles operated	237,661	238,956	58,901	59,067	45,186	45,405	133,574	134,484
Revenues:								
Freight	$2,789,335,328	$2,633,399,094	$1,192,014,127	$1,120,243,458	$549,995,517	$521,052,469	$1,047,325,684	$992,103,167
Passenger	357,900,740	346,324,990	207,818,553	206,440,803	46,429,226	44,750,697	103,652,961	95,133,490
Mail	92,032,046	91,139,845	35,372,298	35,157,318	16,270,445	15,994,669	40,389,303	39,987,858
Express	53,324,415	54,013,021	22,004,354	22,290,981	11,373,772	10,741,933	19,946,289	20,980,107
All other transportation	82,487,439	75,436,336	40,461,901	38,783,265	8,121,325	7,196,753	33,904,213	29,456,318
Incidental	68,162,796	64,296,861	35,935,184	34,386,463	9,921,433	9,374,782	22,306,179	20,535,616
Joint facility—Cr.	9,736,399	9,194,705	2,988,124	2,887,522	2,126,330	2,097,253	4,621,945	4,209,930
Joint facility—Dr.	2,484,130	2,238,035	643,700	591,607	219,612	197,109	1,620,818	1,449,319
Railway operating revenues	3,450,495,033	3,271,566,817	1,535,950,841	1,459,598,203	644,018,436	611,011,447	1,270,525,756	1,200,957,167
Expenses:								
Maintenance of way and structures	393,642,261	365,299,619	151,029,373	144,737,359	75,096,252	70,506,005	167,516,636	150,056,255
Maintenance of equipment†	681,784,261	637,905,613	300,314,748	284,698,379	133,225,475	121,358,152	248,244,038	231,849,082
Traffic	94,183,134	89,249,453	35,505,187	33,777,667	18,058,932	17,147,479	40,619,015	38,324,307
Transportation	1,252,439,672	1,164,065,840	574,518,179	541,449,889	208,522,751	194,200,835	469,398,742	428,415,116
Miscellaneous operations	30,375,482	27,021,460	14,063,534	13,098,868	3,585,135	3,152,365	12,728,813	10,770,227
General	142,858,900	158,492,119	65,413,086	67,065,844	24,859,039	26,299,222	52,586,775	65,127,053
Transportation for investment—Cr.	3,787,389	3,244,585	769,905	1,005,774	430,041	335,998	2,587,443	1,902,813
Railway operating expenses	2,591,496,321	2,438,789,519	1,140,074,202	1,083,822,232	462,915,543	432,328,060	988,506,576	922,639,227
Net revenue from railway operations	858,998,712	832,777,298	395,876,639	375,775,971	181,102,893	178,683,387	282,019,180	278,317,940
Railway tax accruals	236,793,115	239,621,831	98,772,587	101,229,189	49,828,237	47,124,323	88,192,291	91,268,319
Uncollectible railway revenues	1,201,245	1,166,240	653,879	605,183	129,798	195,225	417,568	365,832
Railway operating income	621,004,352	591,989,227	296,450,173	273,941,599	131,144,858	131,363,839	193,409,321	186,683,789
Equipment rents—Dr. balance	85,344,008	89,848,863	40,905,079	43,828,823	3,486,317	5,686,556	40,952,612	40,333,484
Joint facility rents—Dr. balance	35,591,196	36,451,776	20,430,056	20,430,571	3,511,221	4,420,876	11,649,919	11,600,329
Net railway operating income	c 500,069,148	d 465,688,588	235,115,038	209,682,205	124,147,320	121,256,407	140,806,790	134,749,976
Ratio of expenses to revenues (per cent)	75.11	74.54	74.23	74.25	71.88	70.76	77.80	76.83
† Includes:								
Depreciation	191,275,626	184,242,035	83,908,018	81,118,300	37,317,628	35,078,105	70,049,980	68,045,630
Retirements	1,877,496	4,827,165	775,427	1,125,651	390,672	1,930,498	711,397	1,771,016
Maintenance of equipment before depreciation and retirements	488,631,139	448,836,413	215,631,303	202,454,428	95,517,175	84,349,549	177,482,661	162,032,436
Net railway operating income before depreciation and retirements	693,222,270	654,757,788	319,798,483	291,926,156	161,855,620	158,265,010	211,568,167	204,566,622

a Includes credits to General Expenses in the amount of $351,860 on account of reversal of charges previously made for liability under the Railroad Retirement Act of 1934.

b Includes charges to General Expenses in the amount of $981,423 on account of accruals for liability under the Railroad Retirement Act of 1934.

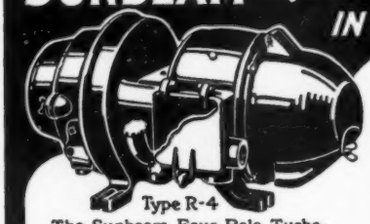
c Includes credits to General Expenses in the amount of $8,414,271 on account of reversal of charges previously made for liability under the Railroad Retirement Act of 1934.

d Deficit or other reverse items.

e Includes charges to General Expenses in the amount of $11,315,128 on account of accruals for liability under the Railroad Retirement Act of 1934.

Compiled by the Bureau of Statistics, Interstate Commerce Commission. Subject to revision.

SUNBEAM *Equipment For Safety in Train Control*



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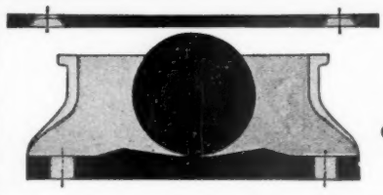

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